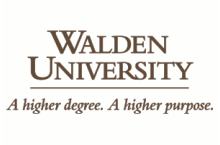

2020

Predictors of Condom Use Among High School Students in North Carolina

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This is to certify that the doctoral dissertation by

Danielle C. Robinson

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

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Walden University
2020

Abstract

Predictors of Condom Use Among High School Students in North Carolina

by

Danielle C. Robinson

MPH, Kaplan University, 2013

BS, North Carolina Central University, 2008

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Public Health, Epidemiology

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June 2020

Abstract

The spread of sexually transmitted diseases is a major ongoing public health issue in North Carolina. Adolescents between the ages of 13 and 19 years have consistently contributed to this trend. Researchers have found that condom use among high school students has decreased. High school students continue to engage in sex with multiple partners, with lack of knowledge about sexually transmitted diseases, even though sex education and prevention programs have been recommended. The purpose of this quantitative study was to evaluate the predictors of condom use among adolescents. The socioecological model theoretical framework was applied to guide this research involving knowledge of sexually transmitted diseases and school-based and parent or other adult sex education that involves multiple social relationships. The sample included 1,002 high school students who completed the 2017 North Carolina Youth Risk Behavior Survey. Data analysis were conducted using binary logistic regressions to examine the predictors of condom use and to determine the statistical significance of each relationship expressed in the research questions. Results from this study showed that sexually active males used condoms more than sexually active females and that there was no relationship between condom use, knowledge of sexually transmitted diseases, and school-based sex education. However, results revealed that the type of knowledge and sex education taught should be explored in relation to the theoretical framework. The outcome of this research indicated that family, teachers, health care professionals, and community members must be engaged for social change to occur to improve sexual health and education among adolescents.

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Dedication

In loving memory of my PhD cheerleaders: my grandmother, Ruby McIntyre; father, Ronnie Ford, and grandfather, Stacy Powell. Thank you for the phone calls and positive messages during this beautiful journey before you departed this earth. I wish you could physically be here to say, “Congrats. You did it, Dr. Robinson.”

To every girl and woman with a dream, do not just dream, own it to live it. May you continue to break every barrier, and eliminate stereotypes, inequality, and injustice as much as you can.

To my Girl Scouts, Troop 650 of North Carolina Coastal Pines: Avery F., Aytumn L., Camille D., Camille J., Chandler C., Cdyni C., Kayla M., Kimani F., Morgan T., Trinity M., Jana B., and Jordan P. You have helped me become a better leader, mentor, and woman. All 12 of you are a ray of sunshine. Thank you for your light and laughter. I hope the outcome of my accomplishments inspires you to become what you dream. Please remember to be a G.I.R.L. (Go-getter. Innovator. Risk Taker. Leader). Each of you has qualities and talents that I hope to have in a daughter.

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To my friends, coworkers, and grief counselor, with whom I discussed this journey during both good and difficult, dark personal moments in my life, thank you for movie and dinner nights, laughter and nonstop fun, hope, prayers, words of encouragement, and shoulders to cry on.

Last, but not least, my mother, Patricia Robinson, thank you for every sacrifice you have made as a single mother, and for raising me to be a woman of sophistication, style, class, respect, and knowledge. It is an honor to be your daughter. The best words you ever told me were “Thank you for making me a proud momma and for never giving me worries or pain, except during childbirth.” The best thing you ever did for me was never leaving my side during my cancer diagnosis. I know it was a nightmare for us, but we are stronger and more fearless. As we always say, “it could have been worse,” but

God decided to spare my life and bless us both, with more days full of love and laughter.

Thank you, and I love you beyond words.

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Chapter 1: Introduction to the Study

Introduction

Sexually transmitted diseases (STDs) have continuously increased each year in the United States. According to data from the Centers for Disease Control and Prevention (CDC), the United States saw increases in STDs between 2013 and 2017. In 2017, there were 1.7 million new chlamydia cases (22% increase since 2013), 555,608 new gonorrhea cases (67% increase since 2013), 30,644 new syphilis cases (76% increase since 2013), and 38,739 new human immunodeficiency virus (HIV) cases (7.32% increase since 2013) reported in the United States (CDC, 2017a, 2018). In 2018, there were 1,758,668 chlamydia cases, 583,405 gonorrhea cases, and 115,045 syphilis cases reported in the United States (CDC, 2019). As the data above indicate, STDs continuously increased for 5 consecutive years. It is evident that this continuous rise in STDs is a public health problem in the United States. To address this epidemic, researchers must be able to understand more about the continuous increase of STDs.

Increases in STDs affect age groups in the United States in different ways. For example, based on incidence and prevalence rates, adolescents and young adults accounted for half of the STDs reported in 2017 (e.g., chlamydia, gonorrhea, syphilis, and HIV; CDC, 2017). In another study, individuals aged 13 to 19 years, also known as youth or adolescents, were reported to show greater increases in new STD cases compared to young adults between the ages of 20 and 25 years and older adults (Ethier, Kann, & McManus, 2018). Evidence has repeatedly shown that youth are the group in greatest need of immediate observation and surveillance to control STD infections across the United States.

STD rates also differ across geographical regions of the United States. Data reported in 2017 on new STD cases by region revealed that the South had the largest percentage increase in STD rates in the country (CDC, 2017a). The South had a 16.1% increase in STD rates, compared to 12.3% for U.S. dependent areas, 10.6% for the Northeast, 9.4% for the West, and 7.4% for the Midwest (CDC, 2017a). Previous research had also shown that nine specific states in the South were disproportionately affected by STDs in individuals between the ages of 15 to 24 years: North Carolina, South Carolina, Tennessee, Georgia, Mississippi, Louisiana, Florida, and Texas (Reif et al., 2015). North Carolina's identification in past research as one of the Southern states highly affected by STDs was a vital reason to focus on rising STDs among the target population in the current study.

North Carolina has consistently been ranked in the top 10 states in the country based on the number of STDs reported to the CDC. According to the CDC's *STD Surveillance 2017 Report*, for individuals 15-24 years old, North Carolina ranked seventh for new chlamydia cases, with a total of 62,876; eighth for new gonorrhea cases, with 22,871; fifth for new syphilis cases, with 1,138; and fifth for new HIV cases, with 1,298 (CDC, 2017, 2018). The number of cases reported for 2017 showed an increase of 16% in STDs (North Carolina Surveillance Unit, 2018). In the CDC's *Morbidity and Mortality Weekly Report* (MMWR), Ethier et al. (2018) mentioned that North Carolina, compared to other southern states, showed no pattern of decrease in sexual activity among high school students. Ethier et al. also found that other states with a decrease in sexually active high school students still were at high risk of STDs based on the number of sexual partners, lack of condom use, and teen pregnancies reported among high school students.

These STD surveillance data and information indicate that knowledge about STDs and sex education among high school should be addressed.

The purpose of this study was to examine the predictors of condom use among high school students in North Carolina. I chose to study condom use because Andrzejewski, Liddon, and Leonard (2019) found that there was a significant decrease in condom use in 2015. Andrzejewski et al. also reported that 43.1% of sexually active high school students did not use condoms. High school students who engage in unprotected sex with multiple partners are likely to be exposed to STDs (Kim, Small, & Okumu, 2018). Reif et al. (2015) mentioned that the lack of knowledge and information about HIV in the South affects the number of newly diagnosed HIV cases in the South. This group of researchers also found that attitudes, behaviors, and perceptions involving STDs indicated that education and prevention programs were needed in the communities of the Deep South (Reif et al., 2015). Such findings informed my decision to study sex education and condom use among high school students in North Carolina.

Sex education was evaluated as a predictor of condom use because it consists of various topics and content that can be either taught or not taught at all. Kim et al. (2018) stated that sex education can provide information and knowledge about sexual behavior, risks, and health. For high school students who are presumed to be sexually active, sex education has been described as a factor for the promotion of safe sex to reduce STDs (Herrman, Kelley, & Haigh, 2017). The concepts and subject matter of sex education can be taught in schools, at home, or by other adults within the environment of the high school student. Moreover, the discipline of sex education is not narrow and can expand beyond biological and sexual development when taught (Kim et al., 2018). This broad

understanding of sex education led me to evaluate both school-based sex education and sex education provided by parents or other adults in this study.

The results from the measured variables potentially identified what information and knowledge about STDs need to be promoted, and which form of sex education—school based or provided by a parent or other adult—requires additional education, resources, and training. This study may contribute to positive social change by promoting increased engagement in sex education for high school students by schools, parents, community members, and other adults, which may influence students' lifestyles in positive ways. This research may also indicate that sex education requirements should be enforced statewide to ensure that sex education is accessible to all high school students to prevent and reduce STDs.

In this chapter, I described the background of the public health issue, provide the problem statement, and present the purpose of the study. In addition, this chapter addressed the study's research questions and hypotheses, theoretical framework, nature, assumptions, scope and delimitations, limitations, and significance.

Background

The sexual behavior of high school students has been addressed and measured in various ways. For instance, Subbarao and Akhilesh (2017) found that young individuals between the ages 16 and 24 years were at a higher risk of STDs, and that the internet, media, and teachers were sources of their sex education. Newton-Levinson, Lichliter, and Mouli (2016) reported that students had limited knowledge about STDs. Maheswari and Kalaivani (2017) found that youth between the ages of 10 and 19 years were highly sexually active and required better knowledge about condom use compared to individuals

who were 20 to 24 years of age. Findings from these studies suggested that additional research should be conducted to determine which factors have been triggering increases in STDs. Currently, there are no studies measuring condom use and knowledge of STDs in relation to sex education provided in a school-based format or provided by a parent or other adult.

Previous experimental studies have presented incidence trends associated with STDs and condom use. For example, Kuru et al. (2016) calculated STD incidence trends for North Carolina and concluded that STD screening was required to reduce the transmission of STDs. Van Handel, Kann, Olsen, and Dietz (2016) found that at least 34% of the U.S. high school student population was having sexual intercourse with four or more partners. Although this previous study was conducted for the entire U.S. high school population, the variables ever been taught about STDs and condom use are relatable to this current study. Statistics showing increases in newly diagnosed cases and prevalence rates for STDs indicate a need to measure education to determine what sort of programs should be developed and implemented to promote condom use among sexually active high school students (Ethier et al., 2018; Reif et al., 2015). By studying condom use and sex education, it may be possible to discover previously unknown information about the sexual behavior of high school students that might better inform STD prevention and sex education efforts.

For this study, a quantitative approach was applied to examine the predictors of condom use. In conducting this study, I sought to determine if the predictors of condom use indicate a need for new initiatives to increase STD prevention and awareness efforts in schools and/or community settings (e.g., those involving parents, educators, mentors,

and private and public health care organizations) to reduce the number of trending STDs reported among high school students in North Carolina.

Problem Statement

STDs have increased among high school students in North Carolina. Annually, the North Carolina HIV/STD Epidemiologic Profile reports newly monitored cases of HIV, syphilis, chlamydia, and gonorrhea. In 2016, high school students between the ages of 13 and 18 years accounted for the following newly reported STD cases (North Carolina STD Surveillance Unit, 2017): 16,082 chlamydia cases, 3,743 gonorrhea cases, 90 HIV cases, and 65 syphilis cases. In 2017, the North Carolina STD Surveillance Unit (2018) reported 18,516 chlamydia cases, 4,291 gonorrhea cases, 86 HIV cases, and 67 syphilis cases among high students between the ages of 13 and 18 years. For 2018, there were 19,244 chlamydia cases, 4,288 gonorrhea cases, 88 HIV/AIDS cases, and 93 syphilis cases reported among high school students between the ages of 14 and 18 in North Carolina. The number of STD cases reported for 2016-2018 highlighted North Carolina as one of the top states with a constant increase in STD incidence.

North Carolina shares public health characteristics with the other southern states, but it is distinguished from other states by its larger population affected by public health disparities (e.g., STDs; Sullivan et al., 2016). In 2015, out of the 50 states, North Carolina ranked second for gonorrheal infections, third for chlamydia infections, and eighth for newly diagnosed HIV cases (CDC, 2016). According to the North Carolina HIV/STD/ Hepatitis Surveillance Unit (2018), North Carolina ranks fourth among the 50 states for STD rates (i.e., chlamydia, gonorrhea, and syphilis). In 2017, there were 120 newly diagnosed HIV cases, 18,132 newly diagnosed chlamydia cases, 4,291 newly diagnosed

gonorrhea cases, and 107 newly diagnosed syphilis cases among high school students in North Carolina (North Carolina HIV/STD/Hepatitis Surveillance Unit, 2018). Compared to young and older adults, high school students had disproportionately high STD incidence (Coeytaux, Kramers, & Sullivan, 2014). Increasing occurrence of STDs among high school students should be analyzed along with sexual behavior in this population.

The sexual behavior of high school students is an evident problem. According to Lightfoot et al. (2015), 39% of high school students who took the Youth Risk Behavior Survey (YRBS) reported not using condoms during their last sexual encounter. Additionally, among high school respondents to the YRBS, 32% were sexually active, and 15% reported having sex with at least four or more partners in their lifetime (Lightfoot et al., 2015). Dehghani, Dehghani, and Dehghani (2017) stated that high-risk behavior among high school students is likely to continue into adulthood. Subbarao and Akhilesh (2017) contended that because STD rates are higher among high school students compared to young adults, knowledge about sex and about information and services used to prevent STDs should be studied among this vulnerable population. This research focused specifically on determining which predictors of condom use affect the sexual behavior of high school students.

Purpose of Study

The purpose of this quantitative study was to evaluate predictors of condom use among high school students in North Carolina. The independent variables for this study included STD education, school-based sex education, and parental and other adult sex education. The dependent variable was condom use. The YRBS did not gather data on

abstinence, monogamy, or other protective behaviors for high school students; therefore, condom use was selected as the only dependent variable.

To further understand the relationship between the independent and dependent variables, grade level, gender, race, and ethnicity were included as covariates for condom use behavior. Grade level, gender, race, and ethnicity were potentially expected to reveal differences between each demographic variable and sex education. The designated variables were derived from 2017 North Carolina Youth Risk Behavior Surveillance System survey data collected from high school students in North Carolina. Each variable was analyzed to determine the predictors of condom use.

Research Questions and Hypotheses

RQ1—Quantitative: What is the relationship between ever having been taught about STDs and condom use among high school students in North Carolina after examining high school grade level, gender, race, and ethnicity?

H01: There is no statistically significant relationship between ever having been taught about STDs and condom use among high school students.

H1: There is a statistically significant relationship between ever having been taught about STDs and condom use among high school students.

RQ2—Quantitative: What is the relationship between ever having received school-based sex education and condom use among high school students

in North Carolina after examining high school grade level, gender, race, and ethnicity?

H02: There is no statistically significant relationship between ever having received school-based sex education and condom use among high school students.

H2: There is a statistically significant relationship between ever having received school-based sex education and condom use among high school students.

RQ3—Quantitative: What is the relationship between ever having been taught by or asked a parent or other adult about sex and condom use among high school students in North Carolina after examining high school grade level, gender, race, and ethnicity?

H03: There is no statistically significant relationship between ever having been taught by or asked a parent or other adult about sex and condom use among high school students.

H3: There is a statistically significant relationship between ever having been taught by or asked a parent or other adult about sex and condom use among high school students.

Theoretical Framework for the Study

The theoretical framework for this study was the socioecological model (SEM). The SEM is a public health behavior model that focuses on the decisions and behavior of individuals and their interactions within their physical and social environment (Dryson et al., 2018). The key elements of the SEM include individual, interpersonal, organizational,

and social/community components. The components of the SEM have been used to explore the behaviors and attitudes of young adults (Dryson et al., 2018). For this study, this model provided guidance to the survey/questionnaire instrument that was used to determine the relationship among the selected variables (i.e., condom use, ever having been taught about STDs, ever having received school-based education, and ever having been taught by or asked a parent or other adult about sex). For instance, the SEM can be used to describe the influences on and environment of sexual behavior regarding the involvement of individual components (high school students at risk), interpersonal relationship components (interactions between family members), organizational components (educators and school based sex education), and social/community components (sex education from parents or other adults). This theoretical framework underlined the importance of involving social networks to improve sexual behavior and sex education.

The SEM served as a tool to describe and understand potential challenges in reducing STDs among high school students. Cramer and Kapusta (2017) found the SEM to be beneficial when customizing and modifying intervention and prevention programs for specific populations. The interpretation of results was expected to identify the influences that have contributed to the high prevalence of STDs among high school students. Results also indicated specific changes that should be considered to promote safe sex among this population in relation to sexual behavior and knowledge of sex.

Nature of the Study

This research involved a quantitative approach using secondary data to investigate the sexual knowledge of high school students in relation to condom use. Quantitative

approaches are often used in relationship-based research to express the associations of the test variables used in the investigation. (Creswell, 2014). This study design was a nonexperimental, cross-sectional study that focused on exploring and observing the relationships among the independent and dependent variables with the inclusion of grade level, gender, race, and ethnicity as covariates. According to Creswell (2014), a nonexperimental design uses survey research that provides quantitative or numerical descriptions of trends, attitudes, or opinions of a target population.

Condom use, knowledge of STDs, and sex education among high school students were measured by the 2017 Youth Risk Behavior Surveillance System (YRBS) survey collected in North Carolina. The sample size for the 2017 YRBS survey involved 3,151 high school student participants. After data cleaning was performed, the final sample size was 1,002 student participants. According to Kann et al. (2018), only completed surveys from the high school student participants were included in the results, and no missing cases were imputed to eliminate information bias and to ensure validity and adequate data.

Definitions

Adolescents: Individuals in the period or developmental stage between childhood and adulthood known as puberty (Asrese & Mekonnen, 2018). This term can be interchangeable with *teenager* and *youth* when referring to high school students.

Condom use: A condom is a form of contraception used to prevent unintended pregnancy and transmission of STDs (Potter & Soren, 2016). Condom use can be measured to determine a relationship between sexual behavior and sexual partners, and the perceived STDs related to sexual relationships (He & Hensel, 2016).

Grade level: A level at which a student is assigned based on age or educational concept (Gaspard et al., 2017). This research focused on high school grade levels (i.e., Grades 9 through 12).

High school students: Students who are enrolled in ninth through 12th grade in high school (Bal-Tastan et al., 2018).

Human immunodeficiency virus (HIV): A chronic STD; a virus that causes acquired immunodeficiency syndrome (AIDS), which can cause morbidity and mortality by attacking the T cells (white blood cells) in the immune system (Dube et al., 2017). HIV has no cure but can be treated with daily antiretroviral medications and therapy.

Parental/adult sex education: Sex education that is taught by either a parent or another adult (e.g., mentor, family member, doctor, etc.) that explores the topics of puberty, abstinence, and safe sex to prevent teenage pregnancy and the spreading of STDs (Kantor & Levitz, 2017).

Sex education: The means of providing instruction, information, and knowledge about sexual health, puberty, reproductive health, relationships, body, genders, sexual orientation, intimacy, affection, and risky sexual behaviors (Kim et al., 2018).

Sexually transmitted diseases (STDs): A group of diseases that are caused by a variety of pathogens that can be transmitted by human-to-human contact by sexual intercourse (e.g., vaginal, penile, and anal sex), oral sex, and deep kissing (Demis, Adera, & Workeneh, 2017; Feldmann, 2018).

School-based sex education: Sex education that is administrated and facilitated by school educators to empower students and to enhance their knowledge about condom use, sexually transmitted diseases and testing, teenage pregnancy, sexual risk-related

behaviors, and self-efficacy (Mahat, Scoloveno, & Scoloveno, 2015; Kim, Small, & Okumu, 2018; Rasberry et al., 2018).

Socioecological model (SEM): A public health model that focuses on the decisions and behavior of individuals and their interactions within their physical and social environment (Dryson et al., 2018).

Youth Risk Behavior Survey (YRBS): A survey that is monitored by the Youth Risk Behavior Surveillance System (YRBSS) and conducted biennially among high school students in Grades 9 through 12 (van Handel, Kann, Olsen, & Dietz, 2015). It is designed to determine the prevalence of health behaviors (e.g., those related to safety, violence, bullying, alcohol, drug use, sex, nutrition, exercise, disabilities, and other health topics). The survey also includes demographic questions related to characteristics such as age, gender, grade level, race, ethnicity, height, and weight.

Assumptions

There are several assumptions to mention about this study. First, the population in the geographical location selected, high school students between the ages of 13 and 18 years in the state of North Carolina, represented the target population required for measurement and study. The southern states of the United States, which include North Carolina, was identified as a region that has been disproportionately affected by new HIV and STD diagnoses among high school students (Ethier et al., 2018; Reif et al., 2018). Ethier et al. (2018) also found no decrease in sexual activity among high school students in North Carolina.

Second, the instrumentation used for this study was expected to precisely assess perspectives on condom use and sex education. The 2017 North Carolina High School

YRBS represented the target population (e.g., high school age and grade level). The survey included questions related to condom use, STD knowledge, and sex education (e.g., school based or provided by a parent or other adult). These variables were essential to this study and could easily be extracted from the North Carolina YRBS to help determine gaps in sex education. Previously, Kim et al. (2018) noted that high school students who are engaged in high-risk sexual behavior (e.g., lack of condom use) were likely to contribute to new STD cases.

Third, the respondents who completed the study were expected to answer the survey questions truthfully and honesty. Those administering the survey informed students that their participation was voluntary, and that their responses would be anonymous to protect their privacy (Kann et al., 2018). The questions were also presented in a multiple-choice format, which prevented exaggeration of responses.

Lastly, the theoretical framework, the SEM, was known to be useful for examining various interpersonal relationships and identifying multiple factors that may be associated with the sexual behavior that was the focus of this study. This study used the SEM to examine the predictors of condom use. Batchelder et al. (2015) stated that the SEM had identified multiple patterns of at-risk sexual behaviors associated with HIV. According to Dyson et al. (2018), the SEM is beneficial in expressing how individual, interpersonal, societal, and community components influence the sexual behavior, attitudes, and intentions of high school students.

Scope and Delimitations

This study focused on STD education, school-based sex education, and sex education provided by a parent or other adult and whether such education related to

condom use among high school students. Data specifically related to sexual behavior and sex-related topics were extracted from the 2017 North Carolina High School YRBS. High school students in this geographical location were the target population because the number of STDs reported showed no decreased pattern of sexual activity. Compared to young and older adults, high school students had a higher incidence rate of STDs. Using data from the YRBS permitted this research to examine how sexual behavior (e.g., condom use), knowledge of STDs, and sex education might be linked to STD rates among high school students.

Given that this quantitative study used a cross-sectional questionnaire, there were additional delimitations to consider. The North Carolina High School YRBS is conducted from February to May during every odd year. The dataset compiled was secondary, which meant that the variables were selected to be measured are extracted from the North Carolina High School YRBS. For comparison, grade level, gender, race, and ethnicity were selected as covariate variables for condom use, knowledge of STDs, and sex education. Furthermore, the sample size and geographical region of this population delimited the study. The sample included only students currently enrolled in high school in North Carolina between the ages of 13 and 18 years. No students under the age of 13 or over the age of 18 were included in the study. The overall sample included voluntary responses from males and females enrolled in ninth through 12th grade who identified their races as American Indian or Alaskan Native, Asian, Black/African American, Native Hawaiian or Other Pacific Islander, or White; and their ethnicity as Hispanic/Latino or Non-Hispanic/Latino . This survey was not administered to youth who lived outside of North Carolina or to students who were not enrolled in public or private

high schools. The boundaries set by the North Carolina High School YRBS allowed this study to be conducted with the necessary population in the appropriate geographical region.

Limitations

There were several limitations to this study. First, the survey questions only asked about intercourse; they did not ask high school students about whether they engaged in anal and/or oral sex. Second, the YRBS was limited to high school students enrolled in school only and did not include individuals of the same ages who were home schooled or currently not attending high school. Third, the YRBS did not ask whether students were aware that STDs (e.g., HIV/AIDS) can be transmitted via intravenous drug use (IDU). Fourth, there were no questions on the YRBS regarding high school students' attitudes toward sex and condom use. Such a question might have enabled comparison between negative and positive views that high school students might have about using condoms or about sex.

Potential challenges and barriers included study participation and response rates. The results of the survey did not indicate whether all high schools participated in the survey, or whether a high school's absence from the study was an administration, local government, or school board decision. Finally, on the first page of the survey, students were permitted to answer what they felt comfortable answering or to leave a question blank. Missing data or missing subjects can increase the nonresponse rate, which can introduce bias as well. If results from the YRBS dataset are missing data from nonparticipants or nonrespondents, then the missing data can be categorized as missing completely at random (MCAR).

Research studies are known to mention missing data but not use MCAR data in datasets. Pedersen et al. (2017) defined MCAR data as individual missing data or cases from the subset of a specific study population. To achieve unbiased estimates, there is a specific statistical approach for dealing with MCAR data. One statistical approach is complete-case analysis (CCA). CCA is widely used for dealing with missing data (Pedersen et al., 2017). This statistical approach only includes completed data, variables, and information from individuals required for the study dataset (Pedersen et al., 2017). From the 2017 YRBS results, Kann et al. (2018) stated that during data processing and cleaning, missing data were not statistically imputed. Therefore, the outcome results from the 2017 YRBS were expected to provide simplicity and comparability analyses as two advantages for this study (Pedersen et al., 2017).

Significance

In completing this study, I sought to address the gap in the literature on predictors of condom use (e.g., knowledge of STDs and sex education) among high school students in North Carolina. The sexual activity of high school students increased by gender, race, and all high school grades, which indicated that sexual behaviors among this population place individuals at high risk of acquiring STDs (e.g., HIV, chlamydia, gonorrhea, and syphilis; Ethier et al., 2018). According to the 2017 North Carolina HIV/STD/Hepatitis Surveillance Report, STDs among individuals aged 13 to 19 years increased by 16% (North Carolina HIV/STD/Hepatitis Surveillance Unit, 2018). This significant increase in STD cases among teens demonstrated that there is a need to focus on this population and the predictors of condom use.

Previous literature emphasized that sex education is a vehicle for social change. For North Carolina, the outcome of this study might support the improvement or implementation of sex education programs and courses as needed to change the sex education culture. Potential contributions to social change include establishing or modifying comprehensive sex education to accommodate every student statewide. Resources containing thorough knowledge about STDs, condom application instructions and accessibility, and statistical facts about STDs in the geographical region of the high school students could increase STD awareness and prevention. This type of positive social change could also improve students' knowledge about risky sexual behaviors, alter sexual behavior patterns, and reduce the risk of STDs for this population.

Lastly, potential change in school-based sex education and sex education provided by a parent or other adult could increase parent and adult involvement in sex education and develop or strengthen healthy relationships among individuals, families, communities, and organizations. This collaborative effort could also draw the attention of public health officials to the importance of supporting sex education, as well as to the need to acknowledge and protect the human rights and health care of youth through mandated laws and policies.

Summary

The purpose of Chapter 1 was to introduce a public health issue regarding the increase of STDs and HIV among high school students in North Carolina. Since 2013, STD and HIV cases have continuously increased among this group compared to young adults and older adults (CDC, 2018; Ethier et al., 2018). To understand this substantial increase, this study was conducted to determine which predictors of condom use among

high school students require intervention and awareness to promote social change with the aim of reducing the number of STD and HIV cases. Previous studies have mentioned North Carolina as a state that showed no improvement in the number of STD and HIV cases, with no change of patterns of sexual activity reported among high school students.

Condom use, knowledge of STDs/HIV, school-based education, and parental or other adult sex education were selected as variables, along with grade level, gender, race, and ethnicity as controlled covariates, to support the purpose of the study and potentially address the gap noted in the problem statement. Definitions for the chosen variables and key terms were presented to provide clarity for the study. In addition, SEM was adopted as the theoretical approach to provide a foundation to clarify the predictors of condom with consideration of its key constructs: individual, interpersonal, organizational, and social/community. Assumptions were mentioned, mainly concerning the population, geographical location, and theoretical framework. For scope and delimitations, the specific time frame of the survey's administration in high schools was taken into consideration, along with age, location, and enrollment. Limitations included limited survey questions, student enrollment, and barriers and challenges that might exist with the data (e.g., missing values, nonresponse rate).

The next chapter, Chapter 2, introduces the literature search strategy, including the databases, search engines, and key terms used to accumulate various scholarly research studies on the topic of interest. Second, the theoretical foundation of the study is defined, and the rationale for selecting the chosen theory is explained, along with a description of how the theory was applied or related to previous studies. Next, I present a

review of scholarly works by researchers associated with the topic of interest, the variables (i.e., independent, dependent, and covariates), and the research questions.

Chapter 2: Literature Review

Introduction

North Carolina has consistently seen increases in STDs among high school students. Compared to young adults and older adults, high school students between the ages of 13 to 18 years have been identified as the population acquiring the most newly diagnosed cases of STDs (Kann et al., 2018). Previous studies have evaluated condom use, sexual behavior, knowledge, and attitudes among high students. The purpose of this research was to evaluate STD knowledge, school-based education, and parental and other adult sex education as predictors of condom use among high school students in North Carolina. Current literature was reviewed and synthesized to understand and determine if such a relationship exists. In this chapter, I discussed the literature search strategy, describe the theoretical foundation, present a literature review related to each variable, and end with a summary and conclusion.

Literature Search Strategy

A systematic literature search was conducted in the Google Scholar search engine and Walden University Library to access several health sciences databases. CINAHL, MEDLINE, Lancet, Science Direct, EBSCO, ProQuest Health and Medical Collection, and PubMed were selected as major databases for this search. The periodic term in years was no longer than 5 years. Published systematic reviews and peer-reviewed journal articles published between 2015 and 2019 were reviewed and referenced. Key search terms used for this study and the health science database included *high school students, adolescence, condom use, sex education, school-based sex education, parental and adult sex education, North Carolina, sexually transmitted diseases (STDs) or sexually*

transmitted infections (STIs), and *HIV/AIDs.* There was limited current research regarding the geographical location; however, references from publications that included the keywords were reviewed and cited.

Theoretical Foundation

The theory-based framework for this study was the socioecological model (SEM). In the 1970s, the SEM was introduced by Urie Bronfenbrenner as a conceptual model that was used to understand human development (Kilanowski, 2017). By the 1980s, the SEM was formed into a theory with consideration of the interaction between individuals and the influences of their environments associated with health-related behaviors (Kilanowski, 2017; Ma, Chan, & Loke, 2017). According to Ma et al. (2017), the SEM is widely used and accepted by those seeking to understand or shape health behaviors. It has been stated that the SEM can be adopted to provide a lens to analyze challenges and support teens' behaviors, lifestyle, and perceptions (Herrman et al., 2017). The components of the SEM make it feasible for further behavior research and analysis.

There are four social components that shape SEM and relate to an individual's behavior. Dryson et al. (2018) cited individual, interpersonal, organization, and community/society components as the social components of the SEM. Each of these components has provided potential support and challenged the development of interventions for safe sex practices and promotion among adolescents (Herrman et al., 2017). Investigators who have examined and practiced the use of the SEM in research have contended that this model determines the perceived severity of a health risk and the vulnerability of a specific population and should be adopted to protect individuals against

sexual health risks (Protogerou & Hagger, 2017). The use of the SEM in research studies appears to help researchers understand the factors that influence sexual behavior.

The SEM has been applied to sexual behaviors such as condom use to evaluate the internal and external factors that interact and possibly influence behavior. For instance, Protogerou and Hagger (2017) applied the SEM to understand the association between condom use and HIV/AIDs risk behavior. Their results revealed that individual condom use was related to alcohol, low hedonism, sexuality acceptance, and age; and based on the SEM components, the relationship of the individuals was based on partner status, communication, sexual experience, and gender-based imbalances (Protogerou & Hagger, 2017). For community and condom use, the actual programs and involvement of health promotion were evaluated, while the societal component and condom use exposed the influence of religious practices and influences, socioeconomic status, and availability and affordability of condoms (Protogerou & Hagger, 2017). Svanemyr, Amin, Robles, and Greene (2015) agreed that the SEM can underline internal and external factors that require supportive relationships from parents, friends, partners, community members, and policy makers to encourage and raise awareness about safe sex. The use of the SEM provided evidence that condom use and risky sexual behavior (e.g., HIV/AIDs) among youth were associated.

The levels of the SEM have been used to recognize the influence of safe-sex knowledge and awareness among teens. Using a focus group, Herrman et al. (2017) aimed to explore the perceptions of 78 teens (14-17 years old) about safe sex and the support and challenges that they experienced. The contributions of teens in this qualitive and descriptive group indicated that comprehension assessments should be used to

influence safe-sex interventions. Responses from teens indicated that programs, resources, and policies should be designed to increase safe-sex support. Herrman et al. (2017) found that the individual, relationship, community, and societal levels of the SEM depend on one another and require support to challenge risky sexual behavior. The sample size and qualitative design were the weaknesses of this study. Advantages included social media influence, the development of more sexual behavior focus groups, and the intention of fostering empathy and improving knowledge and teens' perceptions about safe-sex practices. Svanemyr et al. (2015) described media campaigns as raising awareness about adolescent health and motivating open discussions. Such results indicate that sexual behaviors and practices among teens require further evaluation to achieve positive change.

The SEM has been applied to the evaluation of peer sex education. In an interventional study, Hatami, Kazemi, and Mehrabi (2015) focused on peer sex education among 282 females, with a control group receiving no sex education. The role of peers in this relationship construct of the SEM was to increase awareness and enhance mental, attitudinal, and social change. The strength of the study was the finding that peer education did enhance teens' attitudes and knowledge about safe-sex behavior (Hatami et al., 2015). However, the fact that the researchers did not evaluate skills and behavior during the educational lessons and discussions represented a weakness. The enhancement of teens' knowledge about safe sex was a positive outcome, but peer sex education could result in incorrect instruction of teens, with peers providing some wrong information. Moreover, teens might experience tension, fear, and concerns about sexual behavior, or might feel guilty about their lack of knowledge or participation in sex and condom use,

which might affect their mental and social behavior (Hatami et al., 2015). Peer sex education appears to be beneficial, but it relies on the expertise of adult sex educators to teach and share information in schools and community settings.

The SEM has also been applied to adolescent sexual and reproductive health (ASPH) programs intended to empower adolescents, build positive and supportive relationships, create social norms, foster community support, and promote policies and laws related to health. Svanemyr et al. (2015) organized and analyzed programs according to the social components of the SEM. For instance, on the individual level, the program Teaching and Restoring Youth (TRY) paid girls to attend school. The outcome of this program reduced the risk of STDs among girls who attended school and received sex education (Svanemyr et al., 2015). Parental engagement and peer discussions took place in support of the relationship level. According to Svanemyr et al. this engagement identified health facilities that youth would consider seeking information and contraceptives from and demonstrated that communication between parents and peer groups improved condom use with casual partners, but there was no significant difference with committed or steady partners. On a community level, the Stepping Stone program focused on sex and risk awareness. This program showed no evidence of lowering HIV incidence, but follow-up participation exhibited some positive social change in sex education. In contrast to this program, Program H improved condom knowledge and use among teens (Svanemyr et al., 2015). Lastly, the Geracao program was created on a national level for youth to network and become involved in the development of polices and laws to support and increase health care utilization while impacting teens' attitudes, knowledge, and behavior regarding sex (Svanemyr et al., 2015). The involvement of

teens and their perceptions underlined unknown challenges and issues in sex education programs (Herrman, Kelley, & Haigh, 2017). Discussing program options and monitoring the feedback of teens determined whether the availability of sex education was effective or required new effort and initiatives.

The theoretical framework of the SEM appears to be beneficial for investigations of public health issues involving or related to condom use. For example, Protogerou and Hagger (2017) viewed SEM constructs as important determinants of condom use in a systematic review that underlined that multiple predictors of condom use should be tested because there are multiple environmental factors among the constructs of SEM. Not testing the emotion relation predictor of condom use was a major disadvantage (Protogerou & Hagger, 2017). However, influential factors (e.g., challenges of the individual, family and parental, peers and partners, community, and societal/policy) in accordance with the components of the SEM that influence condom use were identified (Herman et al., 2017). Ma et al. (2017) also stated that the SEM can address the complexities of health behaviors and makes it possible to offer strategies for interventions that will improve sexual health and behavior. For this study, the SEM provided guidance in determining the relationship between condom use, knowledge of STDs, school-based sex education, and parental/other-adult sex education.

Using the SEM, it was possible to describe the influences and environment in relation to (a) individual high school students at risk, (b) interpersonal relationships involving sex educators, (c) organizational relationships involving school-based sex education, and (d) social/community relationships involving parents and other adults providing sex education. Kilanowski (2017) mentioned that this theoretical framework

and its four categories enable examination of the interactive effects of environmental and personal factors that can create a pathway to action, prevention, intervention and program evaluation, and policy adaptation or change. As in other studies, data from this study determined whether the high prevalence of STDs in high schools was associated with condom use, knowledge of STDs, and sex education (e.g., school based or provided by a parent or other adult). Svanemyr et al. (2015) suggested that more studies and interventions should disaggregate the population of individuals 15 to 19 years old from the population of those 15 to 24 years old to recognize the needs or requirements of developmental programs for at-risk teens. The SEM model is known for identifying and expressing the connection between internal and external factors that may influence human behavior (e.g., sexual behavior; Protogerou & Hagger, 2017). Sex education, condom use, and knowledge of STDs are known to play vital roles in the sexual behavior of adolescents (Demis et al., 2017; Svaneemyr et al., 2015). The SEM was selected for this study to underline and explore which internal and external factors (e.g., individual, relationships, community, and societal/policy) negatively or positively influenced the sexual behavior of high school students. This approach helped in determining whether sex education (school based or provided by a parent or other adult) and knowledge of STDs affected condom use among high school students.

Literature Review Related to Condom Use, Knowledge of STDs, and Sex Education

Understanding Condom Use

In North Carolina, the increase of STDs is suspected to be related to the lack of condom use. Witwer, Jones, and Lindberg (2018) composed a report to examine condom use among high school students by comparing the YRBS results from 2013, 2015, and

2017. In 2017, more high school students were sexually active than 2013. Condom use declined from 59% (2013) to 54% (2017) and noncondom users were reported higher among 9th graders (19%) than 11th graders (11%) and 12th graders (12%) (Witwer et al., 2018). The decrease in condom use among high school students between 2013 and 2017 raised and highlighted public health concerns. It was reported that more than 1 in 10 did not use contraception during their last intercourse and that 1 in 5 of 9th graders did not use any STD and pregnancy prevention method. The result of this report suggest that more cohort studies should be conducted, researchers should follow and study students to understand their sexual transition and sex education, and that comprehensive sex education should be available to achieve healthy and safe sexual relationships.

Some research has been conducted on condom use and adolescences. Ethier et al. (2018) discussed that previous studies have shown inconsistent condom use among high school students. (Ethier et al., 2018). For example, Maheswari and Kalaivani (2017) conducted a longitudinal study using medical records of 1,140 adolescents and young adults from January 2015 to June 2015 to measure promiscuity and knowledge about condom use. This study included three groups: Group 1 (ages 10 to 14 years old), Group 2 (ages 15 to 19 years old), and Group 3 (ages 20 to 24 years old). The overall condom use from this study was reported at 23.5% among adolescents (Maheswari & Kalaivani, 2017). Compared to Group 1 (0%) and Group 2 (1.7%), Group 3 (10.9%) had better knowledge about condom use with males outnumbering females. Maheswari and Kalaivani (2017) discussed poor condom use, knowledge, and sexual promiscuity as crucial risk factors to acquiring STDs (p <0.001). Additional strengths include the large number of participants and evaluation of factors associated with STDs and the

inconsistent condom use in the past 6 months of the study. According to Maheswari and Kalaivani (2017) using multiple parameters for sexual activity possibly introduced response bias from participants. Narrowing parameters down to one specific sexual behavior, such as condom use, could eliminate response bias and easily underline what pattern should be studied.

In another study, researchers explored the pattern of condom use and STDs/STIs. Vasilenko, Kugler, Butera, and Lanza (2015) used data from the National Longitudinal Study of Adolescent Health (Add Health) with the inclusion of 16 to 18 years old in Grade 10 through Grade 12. In 1994 to 1995, high school students were interviewed in-home and in-school; then followed up in 1995 to 1996 and 2007 to 2008 (Vasilenko et al., 2015). Results showed that condom use was more relatable to situational factors, not individual and personal characteristics (Vasilenko et al., 2015). In a literature review, Subedi, Jahan, and Basstsen (2018) stated low condom contraceptive among married and unmarried female adolescences was due to knowledge barriers. However, like Maheswari and Kalaibani (2017), Vasilenko et al. (2015) found condom use to be very low among adolescents. In contrast, Vasilenko et al. (2015) discovered that STIs rates were extremely high among adolescents and that intercourse was associated with STIs, with females being diagnosed more than males. The lack of questions and research about oral sex and whether if intercourse was consensual were the weakness of this study. The strengths of this study included the ability to classify the sexual behavior and patterns that put adolescence at risk of STIs, increasing generalizability findings and confirmation that prevention efforts are required (Vasilenko et al., 2015). Because sex education is

expected to strengthen STD prevention, it is essential to review the current status of sex education in North Carolina.

Condom use has also been measured along protective factors. In a cross-sectional study, Hodder et al. (2018) studied condom use and protective factors (e.g., individual resilience and environmental resilience) among 10th graders. The advantage of this study is that it was the first to examine condom use, individual resilience (e.g., goals and aspirations) and environmental resilience (e.g., community and prosocial peers). Hodder et al. (2018) were able to validate that the resilience factors measured did reflect some knowledge of sexual risk behaviors. However, this study was not able to measure the risk of multiple partners and the type of sexual intercourse among condom users. This study was also limited by the sample size. It only included government schools and 10th graders, not all high school grade levels, which limited generalization. Contrary to this study, this research will study grade 9th through 12th to examine the trends and patterns of school-based sex education, parental or other adult sex education and condom use.

Research data from previous studies argued that condom use is potentially related to lack of knowledge, poor use, barriers to access, cost, protective factors, and situational factors among adolescents. The outcome of these studies recommends that sex education be analyzed because condom use is a key component of sex education and a potential source of STD prevention.

Understanding Knowledge of Sexually Transmitted Diseases

It is important to understand the knowledge of STDs, also referred to as sexually transmitted infections (STIs), that has been identified as a major public health issue among high school students in North Carolina. Research on knowledge of STDs and high

school students is limited within the target geographical region. Megersa, Ahmed, Gutema et al. (2017) stated that past and most recent literature addresses knowledge, attitude, and preventative practices for HIV and no other STDs, such as chlamydia, gonorrhea, and syphilis that are highly diagnosed and reported among high school students. Demis, Adera, and Workeneh (2017) stated that the knowledge of STDs is the level of education that should express and elaborate on the route of transmission, signs and symptoms, and preventive methods and practices. Discussing these components of STD knowledge could eliminate the misconceptions or lack of knowledge about the signs and symptoms, and treatments that varies for each STD.

There are studies where some high school students correctly identified STDs and incorrectly identified some STDs/STIs as other infectious diseases. For instance, Megersa et al. (2017) mentioned that high school students identified gonorrhea, syphilis, HIV, Hepatitis B and Hepatitis C as STDs. However, 3.3% from this study misidentified tuberculosis (TB) as a STD (Megersa et al., 2017). In comparison, Subbarao and Akhilesh (2017) discussed that TB was misidentified as a STD along with leprosy, and vitiligo, but other students were able to properly identify gonorrhea, genital herpes, HIV, lymphogranuloma venereum (LGV) and chancroid as STDs. In relations to HIV, Dehghani et al. (2017) revealed that 46% high school students believed that HIV is observed in developing and underdeveloped countries only. Researchers Demis et al. (2017) revealed that 88.5% of their high school student respondents heard about STIs/STDs and 11.5% never heard about STIs. According to Subbarao and Akhilesh (2017), approximately 90% of their students heard about STIs only and 64% had knowledge about STIs beyond HIV. Though some students were able to identify STDs,

the knowledge about curable or non-curable STDs, and the signs and symptoms of STDs exposed significant information regarding STDs knowledge among high school students.

Studies emphasized some differences among this population and their knowledge about treatment and signs and symptoms. Demis et al. (2017) found that 76.2% high school students had knowledge about curable STDs and that 23.8% did not have knowledge about curable STDs. Findings from this cross-sectional descriptive study also revealed the participants' knowledge about signs and symptoms of STDs. Demis, Adera, and Workeneh (2017) used questionnaire data to show that 89.4% answered urethral discharge among males and 88.6% answered vaginal discharge among females as the main site for signs and symptoms. In another cross-sectional study, Megersa, Ahmed, Gutema et al. (2017), discovered that 72.4% of high school students responded that discharge from the vagina and penis, 56.9% loss of body weight, 54.9% genital ulcers or open sores, 52.2% itching of genital area, 45.5% failure to urinate, and 6.7% lower abdominal pain were signs and symptoms of STDs. In addition, other signs and symptoms included on and off fever, swelling in the groin, and pain during urination (Subbarao and Akhilesh, 2017). Subbarao and Akhilesh (2017) also found that 165 out of the 256 high school participants had no knowledge about signs and symptoms associated with STDs. Surprisingly, none of the cited studies mentioned that STDs can be asymptomatic during time of diagnose and transmission.

Studies also showed that STDs transmission is another important component when studying the knowledge of STDs among high school students. Demis, Adera, and Workeneh (2017) discussed that high school students found STD mode of transmission to be 42.5% sexual intercourse, 36.3% contact with contaminated blood and needle, 13.5%

genetics, and 5.7% breast feeding. Subbarao and Akhilesh (2017) found similar mode of transmissions including blood transfusion (72%), not using condoms (69.1%), and drug needles (73.1%). In contrast, high school students also stated that STDs could be transmitted by poor hygiene (14.2%), kissing (13.7%), using a public toilet (8.8%), mosquitoes (10%), shaking hands (4%), and sharing hand and body towels (4%) (Subbarao & Akhilesh, 2017). Students having sex with multiple partners and prostitutes (79.9%) was also found to be associated with transmission of STDs (Subbarao & Akhilesh, 2017). Megersa et al. (2017) conducted a quantitative cross-sectional study with 303 high school student participants that mentioned poor hygiene (24.5%), unclean water (2.3%) and sex during menstruation (18.1%) was related to the transmission of STDs. Another cross-sectional study stated that high school students believed HIV/AIDs was transmitted mostly by contaminated shaving razors, dental and surgical instruments, and donated blood and organs from patients and non-married individuals (Dehghani et al., 2017). The review of these studies showed that some high students have some knowledge about STDs regarding signs and symptoms and type of STD, however, there are some misconceptions about transmission of STDs and preventive practices.

The knowledge of STDs requires specific details. The type, classification, signs and symptoms, route of transmission, causes, treatments and method of prevention are the key mechanisms associated with STDs. Such details about STDs are often discussed in sex education, which explains why the knowledge of STDs will be studied in this research. For the state of North Carolina, there is a possibility that high school students are lacking specific details and knowledge related to STDs.

Understanding School-Based Sex Education

Condom use is known to be a vital topic in sex education. Andrzejewski et al. (2019) states that sex education should include promotion and prevention messages such as condom use to prevent STDs. Unfortunately, sex education has become in competition with general academic subjects as priority (Hall, Sales, & Kmoro, 2017). For example, in a cross-sectional study, Dehghani et al. (2017) had 102 high school students from six schools to answer a standard research questionnaire regarding HIV/AIDs awareness and education. Results showed that the high school participants enrolled in biology knew more about HIV/AIDs compared to other students. Meanwhile, students enrolled in humanities courses (66.6%) significantly knew more information about the method of HIV detection than biology students (41.1%) ($p = 0.01$) (Dehghani et al., 2017). This study only focused particularly on awareness and attitudes of high school students. Condom use was not evaluated among the population or discussed as a potential factor associated with HIV/AIDs awareness.

In another study, students were also enrolled in biology courses that showed some stimulating results. Van Lieshout, Mevissen, de Waal and Kok (2017) monitored an online school-based sex education program that involved a focus group of 17 teachers and 60 students (ages 15-17). After completing the online assessment, students boasted and claimed that the assessment was easy and that they knew enough about sex. However, van Lieshout et al. (2017) concluded that responses about contraceptives, STDs and sex required improvement, and recommended that advanced technology should be incorporated to enhance students' learning ability and comprehension regarding safe sex.

The weakness of this study included the timeframe to complete the assessment and the organization of topics about sex education.

The communication about and availability of sex education may vary. Van Lieshourt et al. (2017) found that sex education is common in some school settings. Subbarao and Akhilesh (2017) mentioned that teachers were a major source for sex education compared to parents, and students required in-depth knowledge about diseases. Sex education and health is considered taboo and not often discussed by many parents and relatives (11%). Some family members and adults often delay in discussing sex health issues with adolescents due to cultural norms, and fears of promoting premarital sex (Subedi, Jahan, & Baatsen, 2018). Nevertheless, 90% of the students agreed that sex education should be included in their curriculum (Subbarao & Akhilesh, 2017). The inclusion of sex education is expected to eliminate or reduce the misconceptions about STD prevention and transmission. Subbarao and Akihesh (2017) found that some students believed the use of emergency contraceptives (e.g., Plan B One-Step, and After Pill) could prevent STDs, 31.4% thought HIV could be cured, and 30% had no knowledge about whether HIV could be cure compared to 30% that were aware that HIV has no cure. Contrast to this study, students have also specified that some teachers rarely discussed puberty, body development, sex, and contraceptives (Subedi, Jahan, & Baatsen (2018).

In some schools setting, sex education programs have been made available to improve sex educational gaps. Condom Availability Programs (CAPs) have been established and used by some schools to expand the educational components of sex education. CAPs had some positive outcomes and negative feedback. According to

Brakman et al. (2017), various studies proved that CAPs in 2.2% of United States schools, in 1996, were effective by 98% and showed declining rates for gonorrhea and chlamydia cases among adolescents. Meanwhile, critics of CAPs in schools argued that baskets of condoms in schools' clinics could increase sexual activity, but there were no current studies to support this argument (Brakman et al., 2017; Wang, Laurie, Govindasamy, & Mathews, 2018). Wang et al. (2018) also found that schools that do have CAPs are not under evaluation or being studied often. However, CAPs combined with STD prevention education programs and additional research could impact condom use. An evaluation of peer education and theater approach could introduce new or existing patterns in sexual behavior from this unique form of sex education.

Peer education is another form of school-based education that has been studied among high school students. In a systematic review, Pusmaika and Novianti (2017), found that health programs on sexual behavior and reproductive system in United States showed no significant differences in the use of condoms among sexually active high school students in an intervention study. However, in a quasi-experiment there was an increase of HIV/AIDs knowledge between 7th graders and 9th graders that received peer education (Mahat et al., 2016). Using a mixed method, Layzer, Rosapep, and Barr (2017) examined the peer-led comprehensive sexual health program, Teen Prevention Education Program (TPEP), which trained 11th and 12th graders to teach sex education to 9th and 10th graders. This program proved that peer-led sex education had some skills to improve and promote positive sexual health. Peer education appears to be effective in reducing risky sexual behaviors. In other nations, such as Nigeria, Ethiopia, Kenya and the Netherlands, peer education programs in primary and secondary schools have improved the attitudes,

knowledge, and safe sex practices among students (Pusmaika and Novianti, 2017). Though peer education on HIV/AIDs is effective in some other countries, these programs should include additional education on other STDs (e.g., chlamydia, gonorrhea, and syphilis).

Another form of peer education has been incorporated in theater. Taboada et al. (2016) discover that various theater-based interventions have been used to address HIV awareness and prevention among adolescents. The uniqueness of this intervention is that it educated and informed the youth and provided the opportunity for them to engage in the topic of condom use and sexual behavior. Though this intervention seems promising and forthcoming, there were a few gaps that should be strengthen in peer education. Taboada et al. (2016) suggested that future research should define and operationalize the theater approach and techniques used, ensure theater-based intervention is grounded and that evaluations among teens and the AMP! (Arts-based, Multiple-component, Peer education) should be conducted. Evaluations from teens on peer education and attendees from theater approach could introduce new or address exiting issues in sex education and patterns in condom use.

Comprehensive sex education (CSE) and abstinence only education (AOE) are two types of form of education made available to some youth. Using cross-sectional data from 2011-2013, Jaramillo, Buhi, Elder and Corliss (2017) were able to study sex education as the primary independent variable among 539 males between the ages of 15 and 20 years old. The most unique finding about this study is that CSE was associated with condom use than AOE among white males, and males with higher family income and educational background (Jaramillo et al., 2017). Fox, Himmelstein, Khalid and

Howell (2019) also studied AOE, which proven to reduce the risk of adolescent pregnancy. This distinguish between the two types of sex education was the strength of both studies. CSE was the best option because it focused on a broad range of sex education topics and it encouraged males to use and understand dual method (e.g. condoms and birth control) to prevent unintended pregnancies and STD diagnoses (Jaramillio et al., 2017). Richards et al. (2019) found that test scores from a CSE program, that involved a health educator model, was effective in reducing sexual behavior among adolescences and young adults. Though CSE and AOE programs did not discuss STDs, recommendations for knowledge of STDs was suggested for future studies.

Unfortunately, some studies revealed that sex education may include only topics about sex and reproduction, and not about STD awareness and prevention. Some studies mentioned that only HIV/AIDs prevention is discussed among high school students. In other cases, sex education may not be offered in schools or there is a possibility that this subject matter conflicts with other subjects (e.g., arts, biology, and humanity courses). For schools that offer sex education, the topics of sex education have caused communication issues and barriers with teachers, parents, and community and misinterpretation in peer sex education.

Understanding Parental or Other Adult Sex Education

Sex education among high school students may be supported and provided by parent(s) or other adults. In a quasi-experiment design, Mahat, Scoloveno, and Scoloveno (2016) examined HIV/AIDS knowledge and parental monitoring among 7th graders (n = 59) ages 11 to 15 years old and 9th graders (n = 81) ages 13 to 15 years old. Parental

monitoring defined as a set of correlating parental behaviors that monitor the activities, adaptions, social and educational influences, and behaviors of their child (Mahat et al., 2016). Results showed that 7th graders had greater sex education knowledge and parental monitoring than 9th graders, and there was a significant difference to gender with females having greater parental monitoring compared to males (Mahat et al., 2016). Contrary to this study, Thoma and Huebner (2018) found that young men who have sex with men (YMSM) had more parent-adolescent communication about condom use. Though, the lack of questions about parental or other adult sex education was a major weakness, the use of grade levels and gender as covariates was helpful with identifying the differences in parental monitoring sex education in adolescences. In this existing study, grade level and gender will be used as covariates with the expectation of showing some significance between male and female high school students (9th through 12th grade) with the inclusion of condom use and parental or other adult sex education variables.

There are limited studies discussing exactly what parents teach or discuss with adolescences and by whom adolescences prefer to talk to or be educated by. However, Kantor and Levitz (2017) surveyed 1,633 parents about sex education in middle and high school. For high school, 86% parents said sex education is very important, 10% parents found sex education somewhat important and 1.4% parents found sex education not important (Kantor & Levitz, 2017). Parents were also supportive in talking about puberty, health, relationships, abstinence, birth control, STDs, and sexual orientation (Kantor & Levitz, 2017). However, it appears that parents communicated with YMSM more about condom use and sex (Tomas & Huebner, 2018). But when comparing heterosexual males and females, females were more likely to have more parental monitoring or conversations

with parents about sex (Mahat, Scoloveno, & Scoloveno, 2015). Results from these studies did not ask whether parents preferred sex education at school or home. According to Kantor and Levitz (2017) having a vast majority of parents supporting sex education was the greatest strength. Research studies did provide evidence that sex education is a wide range topic and should not be limited among high school students.

In a cross-sectional study, 14 to 18 years old young men who have sex with men (YMSM) were examined on parent-adolescent communication about condom use and condom-less and intercourse (CAI) behavior. Thoma and Huebner (2018) focused on the key determinants of condoms: quality of condom, attitude about condom use, subjective norms, perceived behavior control, and intentions for use. This study did not obtain direct information on sex education from parents, but results revealed interesting information regarding parent-adolescent communication about condom use, which is linked to sex education. One advantage is that parent-adolescent communication is associated with the determinants of condom use behavior among YMSM. According to Thoma and Huebner (2018), communication about condom use between fathers and adolescents was rare but was frequent between mothers and adolescents. Though Mahat, Scoloveno, and Scoloveno (2015) did not reveal which parent provided more parent monitoring, this study did show that younger students were more associated with parent monitoring. There were also negative and positive emotions discussed on parent-adolescent communication. Thoma and Huebner (2018) found that negative emotions of adolescents was associated with less favorable condom attitudes and subjective norms, and that higher levels of mother negative emotions was associated with low intentions of condom use. The most striking evidence from this study is that negative emotions of parents

during communication about condom use did motivate YMSM to use more condoms (Thoma & Huebner, 2018). One positive outcome is that as the student's grade level increased, their self-efficacy increased from parental monitoring and sex communication as grade level increased (Mahat, Scoloveno, & Scoloveno, 2015). This is beneficial to this study because condom use was measured along parent or other adult sex education, grade level and gender to determine which grade level is most effective or require sex education.

Though, there are limited studies on parent and other adult sex education, some studies provided evidence that some parents are monitoring their teen's behavior and are very supportive of sex education. However, there is limited research that determines whether adolescents prefer sex education in schools or home, and if parents prefer sex education to be school-base or taught at home. The outcome of the studies concluded that parent or other adult sex education should be examined to determine what advocacy for family/other adult interventions and prevention efforts programs should be established to inform high school students about condom use.

Summary and Conclusion

The literature synthesized shows the possibility that the lack of condom use, misunderstandings about STDs and limited sex education could be related to the increase number of STDs among high school students. This study was conducted to determine the actual relationship between the variables. Potential social change in public health may include rigorous safe sex promotion and awareness, modification to school-base sex education programs, and encourage sex education and support from parents. Findings from this study confidently showed the form of education that requires change, the grade

level(s) and gender that requires sex education, how and where condom use should be promoted, and should school administrators and teachers or parents and other adults require sex education and awareness to help reduce STD rates in North Carolina.

Previous studies and literature reviews recognized some known and unknown information about the condom use, knowledge of STDs, and sex education. For instance, Maheswari and Kalaibani (2017) and Vasilenko et al. (2015) found that condom use was inconsistent among adolescences and higher compared to young adults. Studies like Dehghani et al. (2017), Demis et al. (2017) and Megersa et al. (2017) discussed how adolescence are known for misunderstanding knowledge and incorrectly recognizing STDs (e.g., geographical location, type, curable or non-curable, signs and symptoms, route of transmission, and prevention methods). As for the school-based sex education, studies that compared general subjects (e.g., Biology) to humanities, online or in-classroom, showed sex education was not a priority in some schools' settings and that condom use was not always evaluated (Dehghani et al., 2017, Hall et al., 2017 & van Lieshout et al., 2017). Studies on school-based education also acknowledged that some teachers were hesitated to discuss certain sexual and body health with students. Previous literature on parental and other adult sex education did not identify where adolescences prefer to obtain sex education or whether parents felt comfortable about teaching sex education. However, studies did show parental support for sex education in schools.

Having condom use measured against knowledge of STDs, school-based sex education and parental or other adult education identified if the lack of knowledge about STDs or education is causing high school students to have increased STDs compared to young and older adults. Maheswari and Kalaibani (2017) recommended future studies to

measure condom use and knowledge due to history of studies focusing on attitude and beliefs of adolescences. The outcome of this study extended knowledge about the importance of safe sex practices and whether school-based education or parental and other adult sex education influence the condom use behavior of high school students. In addition, this study distinguished whether STDs knowledge and awareness are promoted and if sex education is offered or taught in North Carolina.

The next chapter, Chapter 3, introduced and discussed the research design and rationale for the study. The methodology section included descriptions about the population, sampling and sampling procedures, archival data, instrumentation, and operationalization of constructs. This section also identified and explained any threats to validity and ethical procedures and conclude with a summary.

Chapter 3: Research Method

Introduction

The purpose of this study was to evaluate predictors of condom use among high school students in North Carolina. In this chapter, I discussed the research design and rationale, methodology, data analysis plan, and threats to validity, concluding with a summary.

Research Design and Rationale

The research design for this study followed a quantitative, cross-sectional approach. This nonexperimental research used secondary data extracted from the 2017 North Carolina High School YRBS. Data from the selected cross-sectional survey consisted of the independent variables (i.e., knowledge of STDs, school-based education, and parental or other adult sex education), dependent variable (i.e., condom use), and covariate variables (i.e., grade level, gender, race, and ethnicity). The use of this cross-sectional survey supported the rationale for using a secondary database. There were no time or resource constraints with this research design. Using this research design and approach, I expected to determine whether the alleged predictors of condom use were relatable and to identify the course of action that should be taken to improve or implement social change.

Methodology

Population

The target population included students who were enrolled in high school from February 2017 through May 2017 in North Carolina. The 2017 North Carolina High School YRBS was completed by male and female high school students who were

enrolled in Grades 9 through 12 and were between the ages of 12 and 18 years. The population included the following ethnicities and races: American Indian/Alaskan Native, Black/African American, Hispanic or Latino, Native Hawaiian or Other Pacific Islander, and White. There were 4,316 student participants.

Sampling and Sampling Procedures

The 2017 North Carolina High School YRBS encompassed regular public schools and charter schools. Private, alternative, vocational, and special education schools were excluded. A total of 40 schools were selected systematically in North Carolina for the YRBS; 36 of the 40 schools were eligible to participate. The school response rate was 92%. The YRBS was distributed in all classes that required a subject or meeting period during the day (Department of Public Instruction, 2018). According to the Department of Public Instruction (2018), each school used systematic probability sampling which involved a random selection of certain classes to participate in the survey. All high school grade levels (Grades 9 through 12) were included. Out of 4,316 sampled students, 3,209 students submitted questionnaires. After the process of data cleaning, 3,151 student questionnaires were useable. The student response rate was 73%. The overall response rate (92% * 73%) was 67%.

The data collected were weighted. Weighting is a mathematical procedure performed for data to represent the population of the sampling (CDC, 2018b). According to the Department of Public Instruction (DPI, 2018), this technique was used for the appropriate data collected in the state of North Carolina because the response rate was over 60%. The DPI (2018) also mentioned that the weight results can be used to make important inferences regarding health-risk behaviors that should be prioritized for public

and private school students in Grades 9 through 12. Weighting was determined and estimated as follows (DPI, 2018):

$$W=W1 * W2 *f1*f2*f3$$

Table 1

Description of Weight Formula

Weight formula	
Variables	Definitions of variables
W1	The inverse of the probability of selecting the school.
W2	The inverse of the probability of selecting the classroom within the school.
f1	A school-level nonresponse adjustment factor calculated by school size category (small, medium, large). The factor was calculated in terms of school enrollment instead of number of schools.
f2	A student-level nonresponse adjustment factor calculated by class.
f3	A poststratification adjustment factor calculated by gender within grade and by race/ethnicity.

Note. Adapted from *2017 YRBS Results: North Carolina High School Survey: Sample Description,* by the Department of Public Instruction, 2018, Raleigh, NC: Department of Public Instruction and the State Board of Education.

Statistical Power Calculator

For the binary logistic regression, a statistical power analysis was conducted using G*Power Version 3.1.9.4. The G* Power calculator created by Faul, Erdfelder, Buchner, and Lang (2009) was downloaded. Xie (2017) indicated that the G*Power calculator enables researchers to perform a variety of calculations and create graphics and statistical statements relating to statistical power analysis. A statistical power and sample size are

required to determine the required level of power (McShane & Bockenholt, 2016). For this study, *z tests* was selected in the *Test Family* drop-down box; *Logistic Regression* was selected in the *Statistical Test* drop-down box, and in the *Type of Power Analysis* box, *Post hoc: Compute achieved power-given alpha level (α), sample, size and effect size* was selected. Power was calculated with the input parameters of two-tailed, known sample size (N = 1,002), alpha level (α = 0.05) and R^2 (.025). The output parameter of the actual power was 0.98. Faul et al. (2009) stated that the acceptable power range is 0 to 1.

There were 1,002 high school students in the final sample group. The parameters in G*Power for the binary logistic regression indicated that 1,002 high school students would achieve an actual power of 0.98. The statistical power for this sample size was met. Figure 1 showed the G*Power graph of the actual power as a function of sample size, alpha level, and R^2.

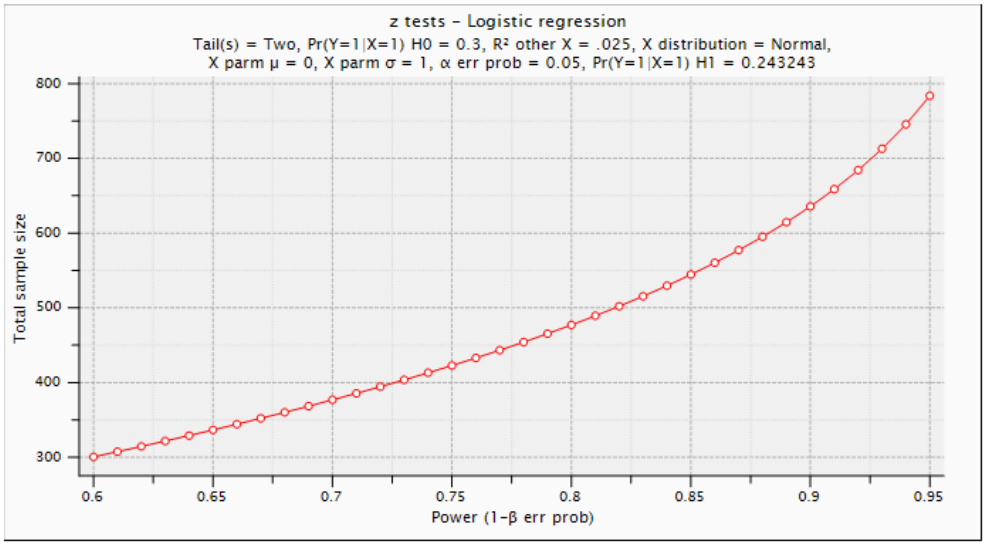

Figure 1. G* Power graph of sample size as function with given two-tailed test, alpha level, and R^2.

Archival Data

The data used for this study were archival data. The North Carolina High School YRBS, which consisted of 99 questions for data collection, was first approved by the CDC's Institutional Review Board (IRB). On a state level, North Carolina required permission from parents for students to take part in the survey and required that the survey be designed with respect for students' privacy. Students were able to complete the survey voluntarily and anonymously during one class by recording their answers on a scannable answer sheet or booklet. The data collected were compiled into a dataset for the public to access online or by completion of a request form sent to the CDC or state representative.

The data for North Carolina were accessed via a data request form. The State of North Carolina YRBS Data Request Form was completed and submitted via email to the data and policy consultant at North Carolina Healthy Schools, a division of the Department of Public Instruction. This form required requester information (e.g., name, organization, phone, and email), request details (e.g., access to 2017 YRBS dataset for research study), North Carolina YRBS data being requested (e.g., high school 2017), and preferred data format (e.g., Statistical Package for Social Sciences [SPSS]), followed by the requester's signature and date. The data and policy consultant immediately provided the following documents associated with the 2017 North Carolina High School YRBS via email: questionnaire, sample description, sample statistics report, codebook, North Carolina high school map form, and dataset in SPSS format.

Instrumentation and Operationalization of Constructs

Instrumentation of constructs. The YRBS questionnaire, published in 2017, was developed by the CDC through the Division of Adolescent and School Health (DASH) to monitor health-related behaviors that are likely to contribute to morbidity and mortality among youth. It is conducted every 2 years during the spring of odd-numbered years from February through May. The YRBS questionnaire was selected for this study because it included measurements for sexual behavior related to condom use, knowledge of STDs and HIV, and sex education among only high school students.

National and state questionnaires and datasets are available online through the website of the CDC. These documents can be accessed for free and downloaded from the YRBS Data and Documentation link on the CDC website. The national questionnaire does not require permission to access or use the datasets from the CDC. However, each state and territory of the United States may vary in how the data can be accessed. For instance, for the state of North Carolina, the YRBS questionnaire and dataset were obtained by submitting a data request form to the data and policy consultant at North Carolina Healthy Schools, a division of the Department of Public Instruction.

The data collected from each state are published and used frequently. According to the CDC (2018c), the YRBS data set is used by federal, state and local government and nongovernment agencies and organizations to track the progress, goals, and modifications of health programs; to support new initiatives, laws, and policies; and to seek additional funding for health promotion. Because the YRBS specializes in high school students, the data collected are used in peer-reviewed journals and articles to evaluate prevention and intervention programs for high school students at risk. Researchers have used the YRBS

to test validation and reliability in previous studies. For instance, Sharma et al. (2018) was able to determine that the rate of HIV testing was very low among adolescent sexual minority males (ASMM) by using YRBS data from 2005 to 2013. Using the same YRBS time frame, Harper, Steiner, Lowry, and Dittus (2018) discovered that high school females were at greater risk of acquiring STDs compared to high school student males based on first sexual intercourse, condom use during last sexual intercourse, and number of partners. Last, Lowry, Dunville, Robin, and Kann (2017) used data from the 2015 and 2016 YRBS, which included sexual orientation for the first time, to determine that first sexual intercourse, substance use, violent victimization, and suicidal thoughts and attempt were associated and disproportionate among heterosexual and lesbian, gay, and bisexual (LGB) high school students.

To assure validation and reliability, survey developers and administrators had to consider and be aware of some aspects. CDC (2018c) states that to obtain truthful answers, administrators were required to express to students: the importance of the survey, that their confidentiality would remain private and respected, and their responses would remain anonymous. This form of internal reliability was done to eliminate or check false responses from students (CDC, 2018b). In addition, validation and reliability on the YRBS has been done in various studies involving specifically high school students. For instance, the CDC (2018c) has prepared numerous Power Point slides, Morbidity and Mortality Weekly Report (MMWR) publications, YRBS Journal Articles (e.g., Journal of Adolescent Health, Journal of School Health, Journal of Interpersonal Violence, American Journal of Preventive Medicine, Lesbian, Gay, Bisexual, and Transgender (LGBT) Health), and national fact sheets (e.g. HIV and other STD

prevention, sexual behavior and HIV testing), and tables comparing district, state, national results (e.g., prevalence estimates and confidence intervals, and t-test analyses) based on the data collected from YRBS regarding sexual behavior.

Operationalization of constructs. The YRBS was selected to examine sexual behavior and health-related topics among high school students. The dependent variable, "*The last time you had sexual intercourse, did you or your partner use a condom?*" is the sexual behavior variable that was studied. It was measured by the following responses: "*I have never had sexual intercourse*", "*Yes*" and "*No*". Condom use is a categorical, ordinal variable that was coded as "*Yes*" = 1 and "*No*" = 2.

The independent variables chosen for this study were designed to study health-related topics. These variables include: "*Have you ever been taught about HIV/AIDS/STDs in school*?", "*Have you ever had sex education in school?*", and "*Have your parents or other adults talked with you about what they expect you to do or not to do when it comes to sex?*". The three independent variables are categorical and ordinal variables. These variables were measured and code as "*Yes*" = 1, "*No*" = 2, and "*Not sure*" = 3.

The demographic covariates for the study were grade level and gender. Grade level is known as a categorical and ordinal variable. In the YRBS, grade level is coded as: 9^{th} grade = 1, 10^{th} grade = 2, 11^{th} grade = 3, 12^{th} grade = 4, and ungraded or other grade = 5. Gender is a dichotomous and nominal variable. Female and male were the only gender options provided on the survey. Gender was be coded as: Female = 1 and Male = 2. No other genders (e.g. cisgender, transgender, binary, and non-binary) were listed on the survey. Race and ethnicity were also selected as covariates. Race was coded as:

American Indian or Alaskan Native = 1, Asian = 2, Black and African American = 3, Native Hawaiian or Other Pacific Islander = 4, White = 5, Hispanic/Latino = 6, Multiple Races - Hispanic/Latino = 7, and Multiple Races- Non-Hispanic/Latino = 8. Ethnicity was coded as: Yes = 1 and No =2 for Hispanic or Latino. Questionnaires that had missing grade levels were not coded and were omitted from data. Table 2 has been prepared to display the variables, their definitions, and codes.

Table 2

Description of Variables and Corresponding Codes

Variables	YRBS questions	Code and label	Type of variables
Condom use	QN53: The last time you had sexual intercourse, did you or your partner use a condom?	A = I have never had sexual intercourse= 1 B = Yes = 2 C = No = 3 Recoded as: A = Yes =1 B = No = 2	Categorical (ordinal) Dichotomous (Nominal)
Knowledge of STDs	QN82: Have you ever been taught about AIDS or HIV infection in school?	A = Yes =1 B = No = 2 C = Not sure = 3	Categorical (ordinal)
School-based sex education	QN81: Have you ever had sex education in school?	A = Yes =1 B = No =2 C = Not sure =3	Categorical (ordinal)
Parent or other adult sex education	QN85: Have your parents or other adults in your family ever talked with you about what they expect you to do or not to when it comes to sex?	A = Yes =1 B = No = 2 C= Not sure = 3	Categorical (ordinal)
Grade level	QN3: In what grade are you?	1 = 9th grade 2 = 10th grade 3 = 11th grade 4 = 12th grade 5 = Ungraded or other grade	Categorical (ordinal)
Gender	QN2: What is your sex?	A = Female = 1 B = Male = 2	Dichotomous (nominal)
Ethnicity	QN4: Are you Hispanic or Latino?	A = Yes = 1 B = No = 2	Dichotomous (nominal)
Race	QN5: What is your race?	A = American Indian or Alaskan Native = 1 B = Asian = 2 C = Black or African American =3 D = Native Hawaiian or Other Pacific Islander = 4 E = White = 5 F = Hispanic/Latino = 6 G = Multiple Races-Hispanic/Latino = 7 H = Multiple races- Non-Hispanic/Latino = 8	Categorical (ordinal)

Data Analysis

Statistical Package for Social Sciences (SPSS) Statistics Version 25.0 was used to perform statistical data analyses for this study. Prior to this procedure, the YRBS dataset was cleaned and weighted using Statistical Analysis System (SAS) and Survey Data Analysis (SUDAAN) by the CDC. Kann et al (2018) stated that the data did not include any inconsistencies or missing data. A total of 3,209 of the 4,316 student questionnaires were submitted. After CDC provided data cleaning, 3,151 student questionnaires for the state of North Carolina was compiled into a dataset. Additional data cleaning was performed on this data set to remove participants that did not meet the response or criteria of the variables such the "*Never had sexual intercourse*" group for condom use (dependent variable).

Research Questions and Hypotheses

RQ1—Quantitative: What is the relationship between ever having been taught about STDs and condom use among high school students in North Carolina after examining high school grade level, gender, race, and ethnicity?

H01: There is no statistically significant relationship between ever having been taught about STDs and condom use among high school students.

H1: There is a statistically significant relationship between ever having been taught about STDs and condom use among high school students.

RQ2—Quantitative: What is the relationship between ever having received school-based sex education and condom use among high school students in North Carolina after examining high school grade level, gender, race, and ethnicity?

H02: There is no statistically significant relationship between ever having received school-based sex education and condom use among high school students.

H2: There is a statistically significant relationship between ever having received school-based sex education and condom use among high school students.

RQ3—Quantitative: What is the relationship between ever having been taught by or asked a parent or other adult about sex and condom use among high school students in North Carolina after examining high school grade level, gender, race, and ethnicity?

H03: There is no statistically significant relationship between ever having been taught by or asked a parent or other adult about sex and condom use among high school students.

H3: There is a statistically significant relationship between ever having been taught by or asked a parent or other adult about sex and condom use among high school students.

Statistical Plan

Binary logistic regression analysis was used to answer the research questions. Wagner (2017) pronounced that logistic regression analyses such as a binary regression

can be used for categorical independent and dependent variables. A binary logistic regression is used to predict the relationships between a predicted binary variable (e.g., yes vs. no, male vs. female, and high vs. low), also known as the dependent variable and two or more independent variables that are continuous (e.g., interval and ratio) or categorical (e.g., ordinal or nominal) (Wagner, 2017). This statistical test fit best for the categorial variables in this research, which includes condom use, knowledge of STDs, school-based sex education, and parental and/or adult sex education. The dependent variable, condom use, comprises of three coded groups: Never had sex =1, Yes = 2, and No = 3. The "never had sex" group was eliminated from this study to focus primarily on the "yes" and "no" groups, which are binary variables that successfully fit the binary logistic regression. The elimination of the "Never had sex =1" group requires the "Yes = 2" and "No = 3" groups to be recoded. Recoding was performed by selecting "Transform" then the "Recode into Different Variable" function. In the "Recode into Different Variables: Old and New Values" box, the "No = 3" group was recoded as "No" = 0 to indicate a lack of absence of the characteristic of interest, and the "Yes = 2" group was recoded as "Yes" = 1. The outcome of this procedure allowed the dependent variable to have two levels (yes and no for condom use) and the ability to examine the demographic variables (grade level, gender, race, and ethnicity). Grade level, race, and ethnicity is expected to show patterns and trends in sex education, influences, and effects of condom use, and improve precision on whether sex education requires change or presence among high school students. The intentions for using gender was to show patterns and trends between both, males and females.

Research Question 1 was answered by using condom use, knowledge of STDs, grade level, gender, race, and ethnicity in a binary logistic regression model. SPSS was accessed to perform this statistical test to determine if there is a relationship between condom use and knowledge of STDs among high school students after controlling the grade level, gender, and race, and ethnicity. Condom use was entered in the SPSS model in the dependent variable dialogue box. In Block 1 of 1, the predictor variable, knowledge of STDs was selected, then the demographic variables, grade level, gender, race, and ethnicity were entered.

Research Question 2 was answered by using condom use, school-based sex education, grade level, gender, race, and ethnicity in a binary logistic regression model. SPSS was accessed to perform this statistical test to determine if there is a relationship between condom use and school-base sex education among high school students after examining the grade level, gender, and race and ethnicity. Condom was be entered in the SPSS model in the dependent variable dialogue box. In Block 1 of 1, the predictor variable, school-based sex education was selected, then the demographic variables, grade level, gender, race, and ethnicity were entered.

Research Question 3 was answered by using condom use, parent or other adult sex education, grade level, gender, race, and ethnicity in a binary logistic regression model. SPSS was accessed to perform this statistical test to determine if there is a relationship between condom use and parent or other adult sex education among high school students after examining the grade level, gender, race, and ethnicity. Condom was be entered in the SPSS model in the dependent variable dialogue box. In Block 1 of 1, the

predictor variable, parent or other adult sex education was selected, then the demographics variables, grade level, gender, race, and ethnicity were entered.

Tables generated from SPSS was developed to interpret the outcome of the statistical tests. Classification plots and 95% confidence interval (CI) for the exponentiation of the B coefficient (Exp (B)) was selected in the logistic regression options dialogue box. For the binary logistic regression, a Model Summary containing pseudo R^2 measures (Cox and Snell $R^2$and Nagelkerke R^2) values is used to explain variation between the dependent variable and independent variables (predictors) (Wagner, 2017).

A parameter estimate table consisted of statistical significance, Exp(B) and 95% CI (lower and upper limits) values. Statistical significance for the independent variable was expressed by the Wald test (Wagner, 2017). In addition, probabilities, formally known as *P* value, was also used to express statistical significance and relationship between the dependent, independent and covariate variables. For instance, if the *p* value is less than 0.05 ($p < 0.05$), then the predictors variables are expected to be relatable (Wagner, 2017). The Exp (B) showed whether if the independent variable was associated with the dependent variable.

Threats to Validity

External Validity

External validity was expected to exist in this study. It is defined as the extent of results that are generalized among the population, outcome, setting and treatment (Patino & Ferreira, 2018; Torre & Picho, 2016). Response bias could potentially expose this research to external validity. Information provided by high school participants may have

not been answered truthfully (Szklo & Nieto, 2014). Excluding surveys that contained missing data and weighting eliminated response bias. Kann et al (2018) stated that weighting was applied to the student's gender, race and ethnicity, and grade level to adjust the oversampling of one population over in each jurisdiction. The outcome of this adjustment increased the external validity to resemble the required response rate.

Internal Validity

Internal validity could possibility be threatened by the population selected for this study. Torre and Picho (2016) defined internal validity as a truth inference made between the cause and effect relationship. For instance, the knowledge, attitude, and beliefs of high school students about sexual behavior may vary in responses. Also, there could be a higher volume of surveys from upperclassmen (e.g., 11th and 12th graders) compared to lowerclassmen (9th and 10th graders) or vice versa, which could also affect the external validity. Increased internal validity has been maintained by researchers weighting the grades. According to Kann et al. (2018), grades 9th through 12th were not oversampled but weighted so that an accurate estimation could match the state representation of the total sample size required. This application of weighing also increased the quality of data.

Ethical Procedures

This study used secondary data collected and compiled by the CDC for the state of North Carolina. Approval by the Institutional Review Board (IRB) was completed by the CDC's IRB before collecting and computing the de-identified dataset, which is publicly available via CDC website for immediate access and download. However, to access the state of North Carolina dataset, a Submit Request Form was completed and submitted to Data and Policy Consultant at the North Carolina Healthy Schools, a

division of the Department of Public Instruction. Survey data will not include any personal information (e.g., name, address, school, social security number, and date of birth). The 2017 North Carolina YRBS was completely de-identified and only consist of recordings of students' age, sex, grade, race, height, weight, and responses to multiple questions regarding health behaviors. Prior to students completing the survey, parents were required to complete a Parent's Permission Form, which was not accessible or required for use in this research study. Students' submission of the YRBS was anonymous.

Other ethical concerns related to participation and data collection include student absent and missing data. Kann et al. (2018) stated that students that were absent were able to make-up the survey to increase student response rate. For missing data, if parent permission forms were not completed and survey had missing responses, then the data was not imputed or included in the dataset (Kann et al., 2018). No conflict of interests, withdrawals or refusals were recorded by survey administrators.

For this doctoral research, an IRB application was required to be submitted to Walden University IRB before performing statistical plan and analysis. The Walden University's IRB application to conduct this secondary research was approved. The Walden IRB approval number is 11-14-19-0659027. Archival data for this research is available in Access, American Standard Code for Information Interchange (ASCII), SAS, and SPSS. SPSS was accessed by a personal computer that is protected by anti-software, firewalls, and passwords. Following IRB approval, the SPSS data file was downloaded and saved on a password protected universal serial bus (USB) flash drive.

Summary

This chapter discussed the research design and rationale for this study. Using the YRBS supports the rationale for choosing this study design. The methodology included high school students, in the state of North Carolina, as the target population. From this population, samples were randomly selected from public and charter schools that participated in the YRBS questionnaire. The dataset was formed from completed questionnaires and was accessible by request form from the Data and Policy Consultant at the North Carolina Healthy Schools, a division of the DPI. Condom use, knowledge of STDS, school-based sex education, and parent or other adult sex education has been selected as the key variables from the YRBS to determine if a relationship exist and if these variables contribute to the increase of STDs among high school students in North Carolina. Using SPSS, each variable was entered in the binary logistic regression test to answer research questions and confirm a hypothesis as explained in the data analysis plan.

Other considerations for this chapter were the threats to validity and ethical procedures. Response bias and answers to questions by students were some potential threats to external validity. Knowledge, attitudes, and beliefs while completing the YRBS were assumed to influence the answers selected, which could also increase internal threats to validity. Grade levels was mentioned as an internal threat to validity. Both, external and internal threats to validity were addressed by weighing the data to eliminate oversampling in grade level and school jurisdictions. Excluding questionnaires with missing answers was another technique to possibly limit threats to validity.

Ethical procedures were minimized by the YRBS being secondary data that has been de-identified. Information from students did not include any personal information. Each participant also required a parent to complete a permission form. Prior to collecting data, CDC's IRB protocol was granted. This research required IRB approve from Walden University's IRB. Lastly, IRB approval was granted, and the archival data was downloaded to a password protected USB for this research.

The next chapter, Chapter 4, will discuss the data collection and results for this study. The data collection will include information regarding time frame, discrepancies, descriptive demographics, and basic analyses. Results are expected to show descriptive statistics, assumptions, and values based on the binary logistic regressions computed using SPSS. This chapter will conclude with a summary about the data collected and the results computed.

Chapter 4: Results

Introduction

The purpose of this study was to evaluate predictors of condom use among high school students in North Carolina. Using SPSS version 25, this study addressed the following research questions and hypotheses:

RQ1—Quantitative: What is the relationship between ever having been taught about STDs and condom use among high school students in North Carolina after examining high school grade level, gender, race, and ethnicity?

H01: There is no statistically significant relationship between ever having been taught about STDs and condom use among high school students.

H1: There is a statistically significant relationship between ever having been taught about STDs and condom use among high school students.

RQ2—Quantitative: What is the relationship between ever having received school-based sex education and condom use among high school students in North Carolina after examining high school grade level, gender, race, and ethnicity?

H02: There is no statistically significant relationship between ever having received school-based sex education and condom use among high school students.

H2: There is a statistically significant relationship between ever having received school-based sex education and condom use among high school students.

RQ3—Quantitative: What is the relationship between ever having been taught by or asked a parent or other adult about sex and condom use among high school students in North Carolina after examining high school grade level, gender, race, and ethnicity?

H03: There is no statistically significant relationship between ever having been taught by or asked a parent or other adult about sex and condom use among high school students.

H3: There is a statistically significant relationship between ever having been taught by or asked a parent or other adult about sex and condom use among high school students.

In this chapter, I discuss the data collection process, present the study results, and conclude with a summary.

Data Collection

The data used for the study were secondary data. The data were provided by a data and policy consultant from the North Carolina DPI. The data were accessible within 1 day after IRB approval on November 14, 2019. The Walden IRB approval number is 11-14-19-0659027. Participants included in the YRBS dataset were high school students currently enrolled in Grades 9 through 12 at 36 regular public and charter schools from January 2017 to March 2017 in North Carolina. The school response rate was 92%. The YRBS dataset contained responses from 3,151 students. The student response rate was

73%. The overall response rate (92% * 73%) was 67%. The data collected had no discrepancies. Prior to access, surveys that contained missing data were excluded, and weighting was performed to eliminate response bias by the CDC.

Descriptive and Demographic Characteristics of Sample

The North Carolina YRBS data, cleaned by the CDC, resulted in a sample of 3,151 high school students. Descriptive statistics for gender, grade, ethnicity, and race are shown in Table 3.

Table 3

Summary of North Carolina Youth Risk Behavior Survey Participant Demographics

Characteristic variable	*n* (%)
Gender	
Female	1,648 (52.3)
Male	1,484 (47.1)
Grade	
9th grade	787 (25.0)
10th grade	1,024 (32.5)
11th grade	709 (22.5)
12th grade	592 (18.8)
Ungraded or other grade	11 (0.3)
Ethnicity (Hispanic or Latino)	
Yes	507 (16.1)
No	2,588 (82.1)
Race	
American Indian or Alaskan Native	31 (1.0)
Asian	121 (3.8)
Black or African American	646 (20.5)
Native Hawaiian or Other Pacific Islander	17 (0.5)
White	1,528 (48.5)
Hispanic/Latino	246 (8.1)
Multiple—Hispanic	255 (8.1)
Multiple—Non-Hispanic	215 (6.8)

There were more female (52.3%) high school respondents than male (47.1%) respondents enrolled in ninth through 12th grade. There were 11 students who were classified as ungraded. For ethnicity, 507 students responded "Yes", and 2,588 students responded "No" to Hispanic or Latino (Question 4). Data for ethnicity (Question 4) and race (Question 5) from the 2017 North Carolina YRBS questionnaire were combined and labeled *raceeth* in SPSS to maintain comparability (CDC, 2018d). In SPSS, the values for *raceeth* were categorized and coded as follows: American Indian or Alaskan Native = 1, Asian = 2, Black or African-American = 3, Native Hawaiian or Other Pacific Islander = 4, White = 5 , Hispanic/Latino = 6, Multiple Races and Hispanic/Latino = 7, and Multiple Races and Non-Hispanic/Latino = 8. Compared to other races and ethnicities, there were 48.5% more White respondents.

In addition to the CDC data cleaning, the sample of 3,151 was cleaned again by removing "never had sexual intercourse" responses from condom use (dependent variable), as discussed in Chapter 3. The final sample group total was 1,002 high school students. Demographics for the final sample group are displayed in Table 4. According to Kann et al. (2018), surveys missing data were excluded, and weighting of students' gender, grade level, race, and ethnicity was performed to eliminate response bias by adjusting the oversampling of the population in each jurisdiction. There was a total of 58 missing surveys excluded from the sample group (CDC, 2018c). In addition, there were missing variables from the sample, such as 420 missing condom use responses, 340 missing knowledge of STDs responses, 337 missing school-based sex education responses, 359 missing parent or other adult sex education responses, 19 missing gender responses, 28 missing grade responses, 56 missing Hispanic/Latino responses, and 292

missing race responses. Means and standard deviation for each demographic variable are shown in Table 5. The means and standard deviations for the dependent and independent variables are shown in Table 6.

Table 4

Demographic Characteristics of Final Sample Size

Variable name	Response codes	Frequency	Percentage
Condom use	Yes	565	56.4
	No	437	43.6
STD/HIV/AIDS knowledge	Yes	780	77.8
	No	76	7.5
	Not sure	146	14.6
Sex education in school	Yes	784	78.2
	No	82	8.2
	Not sure	136	13.6
Parent or other adult sex education	Yes	617	62.6
	No	226	22.5
	Not sure	159	15.9
Gender	Female	521	52.0
	Male	481	48.0
Grade	9^{th} grade	151	15.1
	10^{th} grade	266	26.5
	11^{th} grade	282	28.1
	12^{th} grade	293	29.2
	Ungraded or other grade	10	1.0
Hispanic or Latino	Yes	131	13.1
	No	871	86.9
Race	American Indian/Alaskan Native	18	0.2
	Asian	25	0.0
	Black/African American	240	0.2
	Native Hawaiian or Other Pacific Islander	5	58.6
	White	40	1.0
	Hispanic/Latino	60	0.2
	Multiple races and Hispanic	71	29.8
	Multiple races and Non-Hispanic	105	1.6

Table 5

Demographic Variable Means and Standard Deviation of the Final Sample

Demographic variable	Min.	Max.	Mean	Standard deviation (*SD*)
Gender	1	2	1.48	.500
Grade	1	5	2.74	1.059
Ethnicity	1	2	1.87	.339
Race/ethnicity	1	8	4.83	1.622

Table 6

Variable Means and Standard Deviation of the Final Sample

Variable	Min.	Max.	Mean	Standard deviation (*SD*)
Independent variables:				
Knowledge of STDs	1	3	1.13	.406
School-based sex education	1	3	1.12	.371
Parent or other adult sex education	1	3	1.33	.546
Dependent variable:				
Condom use	1	2	.56	.496

Results

Using SPSS version 25, a series of binary logistic regressions was conducted with the dependent, independent, and controlled variables. This statistical analysis was used to answer the research questions. Descriptive statistics of the sample included gender (female = 521 and male = 481), grade level (9^{th} = 151, 10^{th} = 266, 11^{th} = 282, 12^{th} = 293, and ungraded or other grade = 10), ethnicity (Hispanic/Latino = 131 and Non-Hispanic/Latino = 871) and race (American Indian/Alaskan Native = 18, Asian = 25, Black or African American = 240, Native Hawaiian/Other Pacific Islander = 5. White =

401, Hispanic/Latino = 60, Multiple races—Hispanic = 71, and Multiple races—Non-Hispanic = 105).

Research Question 1

Research Question 1 was answered by performing a binary logistic regression. First, condom use was entered in the dependent variable box. In the categorical covariate box, the predictor variable, knowledge of STDs, was entered following the selection of gender, grade level, and race and ethnicity. Each categorical variable provided the option to select a reference category for comparison. The reference category for gender was female. Ninth grade was the reference category for grade level. The reference category for ethnicity was the "Yes" response group. Native Indian/Alaskan Native was the reference category for race.

The model summary for Research Question 1 implies that the statistical analysis was a perfect fit. Table 7 contains the coefficients, Cox and Snell R^2, and Nagelkerke R^2, which explains variation in the dependent variable (condom use) and the predictor variable (knowledge of STDs). The Cox and Snell R^2 (.025) value did not exceed 1. The Nagelkerke R^2 (.034) value was within range of 0 to 1. These values indicated that 25% and 34% probability of condom use can be explained by the binary logistic regression. In Table 8, the classification table predicted an overall percentage of 58.4% condom users. The binary logistic regression is summarized in Table 9. This model indicated that gender (p = .002) is significant to the prediction and model because the p value for gender is less than the standard p value (.005). Grade level (p =.548), race (p = .340) and ethnicity (p = .376), and ever been taught about STDs (Yes, p = .556; No, p = .282, Not sure = .318) were not significant due to exceeding p value. The odds ratio (Exp(B)) for gender

indicated that males were likely to use condoms .640 more than females. The null hypothesis can be accepted because the statistical test showed no relationship between condom use and the predictor variable, ever been taught about STDs.

Table 7

Model Summary for Condom Use, Knowledge of STDs and Demographic Variables

Step	-2 log likelihood	Cox & Snell *R* square	Nagelkerke *R* square
1	1151.691[a]	.025	.034

[a]Estimation terminated at Iteration 4 because parameter estimates changed by less than .001.

Table 8

Classification Table for Condom Use, Knowledge of STDs, and Demographic Variables

	Observed		Predicted		
			Condom use		Percentage
Step 1	Condom use		Yes	No	correct
		Yes	71	298	19.2
		No	48	442	90.2
	Overall percentage				59.7

[a]The cut value is .500.

Table 9

Binary Logistic Regression for Condom Use and Knowledge of STDs and Demographic Variables

							95% CI	
Step	Variable	*B*	S.E.	Wald	*df*	Sig.	Exp(B)	Lower	Upper
1	Ever taught about STDs/HIV/AIDS (Ref = Yes)			1.175	2	.556			
	No	.498	.462	1.160	1	.282	1.645	.665	4.069
	Not sure	.516	.517	.997	1	.318	1.675	.609	4.610
	Gender (Ref = Female)								
	Male	-.447	.142	9.964	1	.002	.640	.485	.844
	Grade (Ref = 9th grade)			3.062	4	.548			
	10th grade	.530	.939	.318	1	.573	1.699	.270	10.704
	11th grade	.530	.930	.572	1	.449	2.022	.326	12.520
	12th grade	.614	.931	.435	1	.509	1.847	.298	11.446
	Ungraded or other grade	.414	.930	.198	1	.656	1.513	.245	9.361
	Hispanic/Latino (Ref = Yes)								
	Not Hispanic	-.487	.345	1.995	1	.158	.614	.312	1.208
	Race/ethnicity (Ref =American Indian or Alaskan Native)			6.798	6	.340			
	Asian	.488	.646	.570	1	.450	1.629	.459	5.782
	Black/African American	.246	.497	.244	1	.621	1.279	.482	3.389
	Native Hawaiian or Other Pacific Islander	-.165	.268	.379	1	.538	.848	.502	1.433
	White	-1.508	1.186	1.617	1	.204	.221	.022	2.262
	Multiple races/Hispanic/Latino	.032	.251	.016	1	.899	1.032	.631	1.688
	Multiple races/Non-Hispanic/Latino	.645	.389	2.752	1	.097	1.907	.889	4.088
	Constant	-.475	1.058	.202	1	.653	.622		

[a]Variable(s) enter on Step 1: What is your sex, in what grade are you, race, ethnicity, ever taught about STDs/AIDs/HIV at school.

Research Question 2

Research Question 2 was answered by performing the binary logistic regression. First, condom use was entered in the dependent variable box. In the categorical covariate box, the predictor variable, school-based sex education, was entered following the selection of gender, grade level, and race and ethnicity. Each categorical variable provided the option to select a reference category for comparison. The reference category for gender was female. Ninth grade was the reference category for grade level. The reference category for ethnicity was the "Yes" response group. Native Indian/Alaskan Native was the reference category for race.

The model summary for this question indicated that the statistical analysis was a good fit. Table 10 shows that Cox and Snell R^2 (.025) and Nagelkerke R^2 (.033) were in range, as discussed in the results for Research Question 1. These values indicated that 25% and 33% of condom users can be explained by the binary logistic regression model. Table 11 contains the classification results. This table implies that this model was a good fit by showing that 58.4% overall were condom users. The summary of the binary logistic regression is shown in Table 12. Gender (p = .001) showed significance, but grade level (p = .496), race (.322), and ethnicity (p = .146) and ever had sex education in school (Yes, p = .911; No, p = .696; Not sure = .971) did not show any significance to the model. The Exp(B) for gender indicated that males were also likely to use condoms .639 more than females. The null hypothesis is accepted because there was no statistically significant relationship between condom use and the predictor variable, school-based sex education.

Table 10

Model Summary for Condom Use, School-Based Sex Education, and Demographic Variables

Step	-2 log likelihood	Cox & Snell *R* square	Nagelkerke *R* square
1	1157.920	.025	.033

[a]Estimation terminated at Iteration 4 because parameter estimates changed by less than .001.

Table 11

Classification Table for Condom Use, School-Based Sex Education, and Demographic Variables

	Observed		Predicted		
			Condom use		Percentage
Step 1	Condom use		Yes	No	correct
		Yes	100	273	26.8
		No	86	403	82.4
	Overall percentage				58.4

[a]The cut value is .500.

Table 12

Binary Logistic Regression for Condom Use, School-Based Sex Education, and Demographic Variables

Step	Variable	*B*	S.E.	Wald	*df*	Sig.	Exp(B)	95% CI Lower	95% CI Upper
1	School-based sex education (Ref = Yes)			.187	2	.911			
	No	.116	.570	.041	1	.839	1.123	.368	3.430
	Not sure	.002	.608	.001	1	.971	1.022	.311	3.364
	Gender (Ref= Female)								
	Male	-.448	.141	10.110	1	.001	.639	.485	.842
	Grade (Ref = 9th grade)			3.383	4	.496			
	10th grade	.519	.939	.306	1	.580	1.680	.267	10.584
	11th grade	.689	.931	.548	1	.459	1.992	.321	12.343
	12th grade	.606	.930	.425	1	.515	1.833	.296	11.354
	Ungraded or other grade	.385	.930	.171	1	.679	1.470	.237	9.096
	Hispanic/Latino (Ref = Yes)								
	Not Hispanic	-.499	.343	2.109	1	.146	.607	.310	1.190
	Race/ethnicity (Ref = American Indian or Alaskan Native)			6.987	6	.322			
	Asian	.489	.646	.572	1	.449	1.630	.460	5.785
	Black/African American	.194	.503	.149	1	.699	1.215	.453	3.254
	Native Hawaiian or Other Pacific Islander	-.172	.268	.411	1	.522	.842	.498	1.424
	White	-1.509	1.186	1.620	1	.203	.221	.022	2.259
	Multiple races/Hispanic/Latino	.23	.251	.008	1	.928	1.023	.626	1.672
	Multiple races/Non-Hispanic/Latino	.681	.390	3.053	1	.081	1.976	.920	4.242
	Constant	-.081	1.116	.005	1	.942	.923		

[a]Variables(s) entered on Step 1: What is your sex, in what grade are you, race/ethnicity, ever had sex education in school.

Research Question 3

Research Question 3 was also answered by using a binary logistic regression. First, condom use was entered in the dependent variable box. In the categorical covariate box, the predictor variable, parent or other adult sex education, was entered following the selection of gender, grade level and race and ethnicity. Each categorical variable provided the option to select a reference category for comparison. The reference category for gender was female. Ninth grade was the reference category for grade level. The reference category for ethnicity was the "*Yes*" response group. Native Indian/Alaskan was the reference category for race.

The model summary for this question indicated that the statistical analysis was a good fit as well. Table 13 shows Cox and Snell R^2 (.032) and Nagelkerke R^2 (.042) were in range as discussed in the results for research question 1. The Cox and Snell R^2 and Nagelkerke R^2 values interpreted that 32% and 42% of condom users can be explained by the binary logistic regression model. Table 14 presented classification results which implies that this model was a good fit by showing that 60.3% overall are condom users. The summary of the binary logistic regression is shown in Table 15. Gender (p = .001) and students that responded "*Yes*" to parent or other adult sex education (p = .034) and students that responded "*Not sure*" to parent or other adult sex education (p = .035) showed significance. Students that responded "*No*", grade level, race, and ethnicity did not show any significance to the model.

The Exp(B) for gender indicated that males were also likely to use condoms 1.613 more than females. Students that responded "*No*" parent or other adult sex education have higher chances using condoms by .620 compare to students that responded "*Yes*" to

parent or other adult sex education. The null hypothesis can be rejected with respect to the alternative hypothesis because both, "*Yes*" and "*Not sure*" responses showed some statistically significant between condom use and parent or other adult sex education.

Table 13

Model Summary for Condom Use, Parent or Other Adult Sex Education, and Demographic Variables

Step	-2 log likelihood	Cox & Snell *R* square	Nagelkerke *R* square
1	1144.034	.032	.042

[a]Estimation terminated at Iteration 4 because parameter estimates changed by less than .001.

Table 14

Classification Table for Condom Use, Parent or Other Adult Sex Education, and Demographic Variables

			Predicted		
	Observed		Condom use		Percentage
Step 1	Condom use		Yes	No	correct
		Yes	112	257	30.4
		No	83	405	83.0
	Overall percentage				60.3

[a]The cut value is .500.

Table 15

Binary Logistic Regression for Condom Use, Parent or Other Adult Sex Education, and Demographic Variables

Step	Variable	*B*	S.E.	Wald	*df*	Sig.	Exp(B)	95% CI Lower	95% CI Upper
1	Parent or other adult sex education (Ref = Yes)			6.755	2	.034			
	No	.460	.369	1.561	1	.212	1.585	.770	3.263
	Not sure	.812	.385	4.442	1	.035	2.253	1.059	4.793
	Gender (Ref = Female)								
	Male	-.478	.142	11.336	1	.001	.620	.469	.819
	Grade (Ref = 9th grade)			3.477	4	.481			
	10th grade	.482	.949	.258	1	.611	1.620	.252	10.404
	11th grade	.713	.941	.574	1	.449	2.040	.323	12.895
	12th grade	.612	.941	.422	1	.516	1.843	.291	11.657
	Ungraded or other grade	.405	.940	.185	1	.667	1.499	.237	9.468
	Hispanic/Latino (Ref = Yes)								
	Not Hispanic/Latino	-.457	.345	1.747	1	.186	.633	.322	1.247
	Race/ethnicity (Ref = American Indian or Alaskan Native)			5.703	6	.457			
	Asian	.300	.608	.243	1	.622	1.350	.410	4.447
	Black/African American	.241	.501	.232	1	.630	1.273	.477	3.396
	Native Hawaiian or Other Pacific Islander	-.118	.270	.191	1	.662	.889	.524	1.508
	White	-1.579	1.194	1.748	1	.186	.206	.020	2.142
	Multiple races/Hispanic/Latino	.054	.252	.046	1	.831	1.055	.644	1.730
	Multiple races/NonHispanic/Latino	.597	.390	2.340	1	.126	1.816	.846	3.899
	Constant	-.518	1.011	.262	1	.609	.596		

[a]Variable(s) entered on Step 1: What is your sex, in what grade are you, race/ethnicity, parents, or other adults talk about sex.

Summary

The research questions for this study were answered by performing a binary logistic regression for each question. The first binary logistic regression was performed to determine if there was a relationship between ever been taught about STDs and condom use among high students after examining the grade level, gender, race, and ethnicity. Gender was the only demographic variable that showed significance. The outcome of this covariate also revealed that men were likely to use condoms more than females. Grade level, race, ethnicity, and knowledge of STDs showed no significance. The null hypothesis was rejected. There was no statistical significance relationship between condom use and the predictor variable, ever been taught about STDs; therefore, the null hypothesis was accepted.

The second binary logistic regression was used to determine if there was a relationship between school-based sex education and condom use after examining the gender, grade level, race, and ethnicity. Gender was the only variable that showed significance. More males were likely to use condoms compared to females. There was no statistical significance between condom use and the predictor variable, school-based sex education. The null hypothesis for this research question was also accepted.

The third binary logistic regression was used to determine if there was a relationship between parent or other adult sex education and condom use after examining the gender, grade level, race, and ethnicity. Gender and the students that responded "*Not sure*" to parent or other adult sex education were significance. Grade level, race, ethnicity, and the "*No*" responses to parent or other adult sex education were not

significant. Because the statistical analysis showed a statistical significance between condom use and the predictor variable, parent or other adult sex education, the alternative hypothesis was accepted.

The next chapter, Chapter 5, will discuss the interpretation of the findings, limitations of the study, recommendations, and implications. Interpretation of findings will extend knowledge relating to the results in comparison to previous peer-reviewed literature and the context of the theoretical framework. Limitations describing any generalizability, trustworthiness, validity and reliability from the study will be discussed. Based on the weakness and strengthens of the study, recommendations will be mentioned for future research. Lastly, the implication section will describe the potential impact of social change and practices that should occur among high school students, families, sex education, health promotion and campaigns, and policy makers. This chapter will conclude with an overall summary of this dissertation.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of this study was to examine the relationship between the predictors of condom use among high school students in North Carolina. The study used a quantitative approach involving secondary data. Data were collected from the 2017 North Carolina YRBS. Condom use, knowledge of STDs, school-based sex education, and parent or other adult sex education were the variables measured from the YRBS survey. Using SPSS Version 25, descriptive statistics were provided. This study was conducted to produce results that would determine if the predictors of condom use required new initiatives to increase STD prevention and awareness in school and community settings.

Interpretation of the Findings

Prevalence of Condom Use

The dependent variable for this study was condom use. Data collected for this study indicated that 56.4% of high school students did participant in condom use in North Carolina. Previous studies also measured and studied condom use among high school students and adolescents. For instance, using YRBS data, Witwer et al. (2018) measured condom use from 2013 and 2017. They found that condom use among high school students declined from 59% in 2013 to 54% in 2017 (Witwer et al., 2018). Compared to their outcome, results from this study showed improvement in condom use by 2.4%. However, in 2017, Maheswari and Kalaivani (2017) reported that condom use remained low among high school students at 23.5%. Jahan and Bassten (2008), Vasilenko et al. (2015), Ether et al. (2018), and Hoddler et al. (2018) also found condom use to be

consistently low among high school students compared to young adults, with challenges related to situational factors, sexual behavior, and protective factors. Findings from this study showed that condom use among high school students has improved but remains inconsistent, which might influence the disproportionately high rate of STDs among high school students.

The fluctuation of condom use among high school students implies that condom use is not consistent. For public health, more evidence-based research on types of condoms, availability, cost, descriptions, and examples of application might lead to the development of safe-sex programs and campaigns with a mission to encourage positive sexual behavior and reduce the number of STDs reported among adolescents.

Condom Use, Knowledge of STDs, and Demographic Variables

The binary logistic regression showed that knowledge of STDs was not significant to condom use among high school students in North Carolina. However, after the examination of the demographic variables, gender (male = .002) was the only demographic variable that showed significance compared to grade level, race, and ethnicity, which did not show any significance either. Apparently, males were likely to use condoms more than females. Data also showed that 77.8% (n = 780) of high school students received knowledge about STDs/HIV/AIDS. These findings are consistent with other studies that reported high school students having knowledge of STDs/STIs. For example, Demis et al. (2017) stated that 88.5% of high school students responded to having knowledge of STDs/STIs and 83.1% were aware of prevention of STDs/STIs. Subbarao and Akhilesh (2017) also showed that 90% of high school students had heard

about STIs but 64% had actual knowledge about STIs beyond HIV/AIDS. Unlike this current study, Demis et al. (2017), Subbarao and Akhilesh (2017), and Megersa et al. (2017) focused on measuring knowledge, attitudes, and practices of STIs/STDs associated with socioeconomic factors, prevention methods, and transmission methods. The outcome of these studies revealed misconceptions about STDs/STIs transmission and prevention methods and indicated that condom use among high school students was poor. This study did not address relationships between socioeconomic factors, knowledge of transmission methods and prevention methods, and the type of STD/STI knowledge that high school students acquired.

The consistent misconceptions about knowledge of STDs in previous studies and the lack of knowledge of what high school students are being taught underline the importance of additional research. Although students are receiving knowledge about STDs, there is little or no information about what is being discussed and presented to high school students in North Carolina. Additional studies are needed to evaluate more information regarding STD transmission, types of STDs, clinical manifestations, effects of STDs, treatment, and sources of information provided to students.

Condom Use, School-Based Sex Education, and Demographic Variables

The binary regression also showed no significance in the relationship between condom use and school-based sex education among high school students in North Carolina. After examining the demographics, there was no significance in grade level, ethnicity, and race. However, gender did show some significance. Males (p =.002) appeared to use condoms .639 more than females. Even though there was no significant

relationship between condom use and school-based education, data from this study indicated that 78.2% (n = 780) of high school students in North Carolina did receive school-based sex education. Contrary to this study, previous literature focused on the topics of sex education that were discussed in humanities and biology courses. For instance, Dehghani et al. (2017) discovered that 66.6% of high school students who enrolled in humanities received information about sex and STDs, compared to 41.1% of high school students enrolled in biology courses. Hall, Sales, and Kmoro (2017) stated that general academic subjects were priority to school-based sex education courses. This study did not indicate whether condom use was being studied among high school students during humanities and biology academic courses.

Research Question 2 focused primarily on condom use and school-based sex education, but no specific type of school-based education was well defined. Previous studies mentioned school-based sex education in the forms of peer education, comprehensive sex education, abstinence-only education programs, and online sex education for STD awareness and prevention. For example, Layzer, Rosapep, and Barr (2017), Pusmaika and Novianti (2017), and Taboada et al. (2016) found that minimum condom use assessments among high school students were associated with peer-led programs and theater-based interventions in school-based settings. Jaramilio, Buhi, Elder, and Corliss (2017) and Richards et al. (2019) found that condom use was associated with comprehensive sex education more than abstinence-only education, which seemed more influential in decreasing high school pregnancies. For online sex education in school-based settings, no evidence of condom use or knowledge about condom use was

evaluated (Van Lieshout et al., 2017). Unlike these studies, this study did not show what type of sex education was most effective among high school students.

Findings from this review indicated that there is a lack of information regarding school-based sex education in North Carolina. It appears that school-based sex education exists, but there is no clear understanding of availability in every school or whether parental permission must be granted for students' enrollment and participation. Other concerns with school-based sex education include the fact that it has not been determined whether high school students in North Carolina receive comprehensive sex education, which involves subject matter in human development, sexual behaviors, and contraception, or abstinence-only education, which encourages high school students to delay sex until marriage.

Condom Use, Parent or Other Adult Sex Education, and Demographic Variables

The binary regression showed some significance in the relationship between condom use and parent or other adult sex education among high school students. Students who responded "Yes" (62.6%, $n = 617$) and "Not sure" (15.9%, $n = 159$) showed significance. Students who responded "No" (22.5%, $n = 26$) did not show any significance. After carefully examining the demographics, I found no significance between grade level, race, and ethnicity. However, males ($p = .001$) who received parent or other adult sex education were likely to use condoms .620 more than females. Compared to this study, researchers primarily focused on knowledge of HIV/AIDS and behavior monitoring among high school students by their parents. Mahat et al. (2016) found that middle school students had more knowledge about HIV/AIDs compared to

high school students, but high school students received more parent monitoring for behavior than middle schoolers did. When discussing condom use, young men who have sex with men (YMSM) received more one-on-one sex education and communication from parents than young heterosexual females and males (Thoma & Huebner, 2018). For this current study, sexual orientation was not addressed. This study also did not examine parents' feelings about and support for sex education and condom use as Kantor and Levitz (2017) did among youth.

Findings from this research imply that parental or other adult sex education is disproportionate by gender, in that males receive more parental or adult sex education than females. The outcome of this research does not explain the significance of this relationship or clarify exactly what parents or other adults are teaching high school students about sexual health, condom use, and STDs.

Analysis of Socioecological Model of the Study

The SEM was applied to this study to understand the influences and factors associated the predictor of condom use among high school students. Individual, interpersonal, organization, and community/society are the key constructs of SEM that were analyzed. In the context of this theoretical framework, condom-use behavior, knowledge of STDS, and sex education were taken into consideration to determine whether a relationship exists between the key variables. The first level of the SEM, individual, involved the high school students and their knowledge and level of education that might influence their condom use. On the second level, interpersonal relationships were examined between high school students and health educators, family, and other

adults who might influence their sexual health education and behaviors in relation to condom use. Such relationships could introduce high school students to safe-sex methods, programs, and strategies to strengthen their sexual knowledge, behaviors, and health. The third level involved organizational settings such as schools, where school-based sex education is taught by health educators. The fourth level involved community settings that parents or other adults that should support comprehensive sex education, abstinence-only education, and other sexual health programming and resources outside of schools with high school students at risk.

Findings of this study showed that condom use, knowledge of STDs, and school-based sex education were not statistically significance. However, the demographic variable revealed that males used condoms more than females and that high school students were influenced by parent or other adult sex education. The results indicated that interpersonal, organizational, and community relationships that appear to involve parents and other adults (e.g., mentors, teachers, community leaders, health care providers) are influential factors in sex education among high school students.

Limitations of the Study

There are several limitations to consider that may affect the generalizability of this study. First, the North Carolina YRBS sample group did not include high school students who were currently home schooled or enrolled in private, alternative, vocational or special education schools. Second, the YRBS did not ask students about their socioeconomic status (SES), which could have been controlled to determine if high school students' knowledge of STDs and sex education were influenced. Third, removing

students who responded “I have never had sexual intercourse” from the condom-use question reduced the sample size. This may have also affected the quality and quantity of responses associated with the independent variables (i.e., knowledge of STDs, school-based sex education, and parent or other adult sex education) and covariates (i.e., gender, grade level, race, and ethnicity). The other option was to combine the “I have never had sexual intercourse” and the “No” responses to condom use. To prevent response bias, this option was not performed. Students who responded “No” to condom use probably had sexual intercourse experiences without condom use, unlike the students who responded that they had no sexual intercourse experience, which implied no condom use. Fourth, the use of a cross-sectional study design was expected to show exposure and outcome; however, it was not able to determine a cause-and-effect relationship between the variables in this study.

Finally, the information provided by high school students could affect the level of trustworthiness. However, there was no specific way to identify any inaccurate answers regarding the students’ condom-use activity, knowledge of STDs/STIs, and sex education (e.g., school-based or provided by a parent or other adult). Prior to students completing the survey, Kann et al. (2017) documented that administrators informed students that their participation in the survey was anonymous and that each question should be answered truthfully and honestly.

Recommendations

Previous research studies suggested that sexual behavior and access to sex education among the adolescent population should be further studied. Applying a

quantitative method to this study also provided interesting findings that suggest the need for further research for the state of North Carolina. First, surveys should be permitted for use at the schools that were excluded. This could increase the sample size and enable researchers to monitor knowledge of STDs/STIs and sex education at private, alternative, vocational, and special education schools. The outcome of this instrumentation at the excluded schools could possibly determine a difference in the form of sex education taught or lack of availability at a certain school. Including the excluded schools could also allow researchers to study gaps in sex education between the various types of schools.

Second, the instrumentation used for this study should be revised to include detailed questions about the sexual behavior, knowledge about sex education, and SES of high school students. The YRBS only collected information on whether students received school-based sex education and parental or other adult sex education or not. The survey should include questions about whether students practice abstinence or monogamy, and whether female students use other forms of protection (e.g., female condoms). The YRBS did not provide specific details about the type of knowledge of STDs/STI acquired by high school students. The survey should also be specific about the students' sexual behavior (e.g., oral, anal, and intercourse), history of STDs/STIs, and knowledge about STDs/STIs (e.g., type, cause, mode of transmission, symptoms, and treatment). The inclusion of SES on the YRBS will allow researchers to study whether if the SES of students affects their educational attainment of knowledge about STDs and sex education.

Last, more evidence-based research on the various types of sex education and prevention programs among high school students should be studied. The YRBS should ask whether high school students are aware of condom availability programs (CAPs) in North Carolina. For school-based sex education, students should be asked about the type of sex education offered by their school, such as comprehensive sex education, abstinence-only education, theater-based education, and peer sex education (e.g., groups, seminars, and presentations).

Implications

Knowledge about STDs and sex education is critical to every person's health and well being. This study showed that additional studies on sex education and knowledge of STDs among high school students should be conducted involving other essential research variables to narrow down the many potential challenges that could be affecting high school students' sexual behavior. There was no significant relationship between condom use and knowledge of STDs and school-based sex education among high school students. However, based on this outcome and the significant relationship shown between condom use and parent or other adult sex education, there is a need to consider how sex education might provoke social change.

The impact of social change requires long-term effects across the multiple levels of the theorical framework SEM. At the individual level, high school students will be able to recognize the importance of sex education and understand that their behaviors, knowledge, attitudes, and skills can be positively influenced by medically appropriate and comprehensive sex education programs and resources. On the level of interpersonal

relationships and networks, students will be positively influenced by family members, peers, and social groups. This level also has the potential to strengthen the student–parent relationship through knowledge and support of STD and safe-sex awareness, education, and prevention. The organizational level will enable students, with the support of health educators and teachers at their school, to participate in medically accurate age- and culturally appropriate mandated sex education courses throughout North Carolina. The community level will encourage students, parents, and social circles to advocate for comprehensive sex education and collaborate with state public health officials and government to develop policies and laws that support sex education and statewide campaigns to promote STD and safe-sex awareness. This type of involvement, practice, and promotion of sex education could improve overall sexual health and reduce STDs among high school students.

Conclusion

This study was conducted to examine the predictors of condom use among high school students in the state of North Carolina. Results showed that condom use was not statistically significant to the knowledge of STDs and school-based sex education. Parent or other adult sex education and condom use did show statistical significance. After examining gender, grade level, race, and ethnicity, gender was the only demographic variable that revealed significance to the predictors of condom use. The dependent variable and the predictors of condom were important to this study because they are known to be associated with sexual behavior and have not been studied among high school students in the state of North Carolina.

Research has been conducted on sexual behavior among high school students in other states within the United States and other nations. This study showed some consistently with previous studies based on the number of high school students that responded to having knowledge of STDs in North Carolina. Unfortunately, this current study was not able to measure what type of knowledge of STDs (e.g. type, cause, mode of transmission, and treatment) or specific type of sex education (e.g. comprehensive, abstinence only, online, peer, or program) that high school students obtained in comparison to other studies. The findings of this study did show a relationship between condom use and parent or other adult sex education among high school students. The increase of STDs among adolescence indicates that sexual behavior requires intervention.

It is imperative that researchers and public health professionals consider analyzing the various forms of sex education and knowledge of STDs among adolescences with the inclusions of demographics. The impact of this work could possibly help ease the gap between sexual behavior, sex education, and condom use with the intention to reduce STDs disparities among adolescence. Additional practice in this area could also create social change that could encourage the youth, parents, educators, and community to engage in safe sex and STD awareness and prevention.

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